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Literature references in [ ] refer to the *Review of Applied Mycology*.
Map references are to the C.M.I. distribution maps of plant diseases.

TANDON (R. N.) & GREWAL (J. S.). **Effect of nitrogen nutrition on growth and sporulation of some pathogenic fungi.**—*Proc. Indian Acad. Sci.*, Sect. B, 44, 2, pp. 61–67, 1956.

At the Department of Botany, University of Allahabad, the authors studied the nitrogen nutrition [cf. preceding and next abstracts] of an isolate of *Gloeosporium musarum* from banana [cf. 34, p. 160] and isolates of *G. papayae* and *Colletotrichum papayae* [cf. 31, p. 55] from papaws, grown in a modified Czapek liquid medium in which the sodium nitrate was replaced by each of 28 organic and inorganic nitrogen compounds under study, at 329 mgm. nitrogen per l. The dry weight of mycelium obtained, the nature of the sporulation, and in the case of *C. papayae* the degree to which setae were formed is tabulated. Sodium and potassium nitrites did not support growth of any of the fungi, but all nitrates (except ammonium) and the majority of the organic compounds supported good growth. Ammonium salts of inorganic acids and thiourea gave poor growth. Urea, D-alanine, acetamide, and all nitrates except that of ammonium gave good sporulation. Most ammonium salts, glycine, glutamic acid, valine, methionine, L-phenyl-alanine, L-leucine, L-aspartic acid, and thiourea gave at best fair and often no sporulation.

NATARAJAN (S.). **Carbon nitrogen metabolism of soil fungi. I; II.**—*Proc. Indian Acad. Sci.*, Sect. B, 44, 5, pp. 289–299, 8 graphs.; pp. 300–310, 18 graphs, 1956.

In the first of these two investigations at the Chemistry Department, Madras Christian College, Tambaram, the author studied the nitrogen and carbon metabolism of *Fusarium vasinfectum* and *F. udum* [35, p. 326 *et passim*] on Richards' medium, substituting sodium and potassium nitrates, ammonium sulphate, and ammonium chloride as different nitrogen sources, and glucose for sucrose as an alternative source of carbon. All the nitrogen sources were utilized, the consumption of sugar being greater with the nitrates. The nitrogen content of the mycelial mats varied with the carbon and nitrogen sources and with the age of the culture and specificity of the organism.

In the second study the growth of the two species was examined with ammonium nitrate as the sole source of nitrogen, and four levels of sucrose. The pH fell in the first four days with both species, subsequently rising slowly to neutral. After an initial drop the level of ammonium nitrogen remained steady for a given sucrose level, the rate of growth varying with the sugar concentration. The rates of sucrose depletion and nitrogen accumulation followed an exponential pattern with both fungi.

THOMSON (A. D.). **Definition of Potato virus X strains present in New Zealand Potato varieties.**—*Aust. J. agric. Res.*, 7, 6, pp. 527–535, 2 pl., 1956.

In a study at the Crop Research Division, Department of Scientific and Industrial

Research, Lincoln, New Zealand, of 13 different strains of potato virus X [cf. 34, p. 313], 11 were isolated from the three most widely grown potato varieties in the country, viz. Aucklander Short Top, Dakota Red, and Arran Chief, or from unknown varieties, and one each from Craigs Bounty and a seedling, U.S.D.A. 3 XE–1. Only one of the strains (X1) displayed any marked changes in symptom picture over a period of two years, this change being induced by three months in a deep-freeze unit. All gave precipitin reactions with an antiserum prepared against one of them. Inoculation of *Datura stramonium* plants with an avirulent strain (AST4) prevented infection by the other strains.

The relative severity of the strains towards various test plants was about the same. *Nicotiana glutinosa* proved satisfactory for the isolation and differentiation of most of them, and *Gomphrena globosa* reacted with local lesions to all. One isolate, AST1, was found to contain both mild and severe components. Its passage through *Cyphomandra betacea* resulted in the selection of the severe component; also present was a component which invaded *Chenopodium album* systemically, which no other strain did. *Chenopodium* and *Cyphomandra* appear to be suitable for the identification of certain mild and severe virus X strains in mixtures.

Müller (K. O.) & Munro (J.). **The affinity of Potato virus Y infected Potato tissues for dilute vital stains.**—*Phytopath. Z.*, 28, 1, pp. 70–82, 3 figs., 1956. [German summary.]

At the National Institute of Agricultural Botany, Cambridge, the rate at which necrotic changes developed in the collenchyma, phloem, and parenchyma of potato plants (eight commercial varieties and eight seedlings [18, p. 705; 30, p. 625]) inoculated with different strains of potato virus Y [35, p. 481] was determined by the application of rhodamine B, neutral red, and brilliant cresyl blue at concentrations of 5 p.p.m. in distilled water. The present report is limited to experiments with the first-named.

Independent of the host-virus strain combination, a close correlation was found to exist between symptom expression and the response to vital staining. No increased affinity for the stains was shown by the stem tissues reacting to infection only by local lesion or mosaic development. On the other hand, in those developing systemic necrosis soon after inoculation, relatively large quantities of the dye were accumulated in the collenchyma, phloem, and adjacent parenchyma before any noticeable pathological alterations occurred in those areas.

The reaction to the stains is non-specific and the method can also be used for the detection of pre-lethal changes in the phloem of plants infected by potato leaf roll virus [27, p. 123].

The response of diseased tissues to vital staining was most marked in varieties known from field trials to be fairly resistant to virus Y, e.g., Arran Victory. This observation is considered to provide further support for the theory that field resistance is attributable for the most part to hypersensitivity to individual strains of the virus.

Arenz (B.). **Die Ausbreitung der Viruskrankheiten (Blattroll- und Strichelkrankheit) der Kartoffel in Abhängigkeit von Sorte und Umweltsbedingungen.** [The spread of virus diseases (leaf roll and streak disease) of the Potato in relation to variety and ambient conditions.]—*Jb. bayer. Landw.*, 33, 6, pp. 657–674, 3 figs., 1956.

In this work from the Landessaatzuchtanstalt, Weihenstephan [cf. 32, p. 273], the author had access to the widely distributed official testing stations at which each year 22 of the potato varieties used in Bavaria are tested for their performance under a broad range of natural conditions. These varieties were examined in the field from 1953 to 1955, a comparison being made each year between the original per-

centage of mother plants infected by leaf roll virus and streak [? potato virus Y], as detected by the 'eye-cutting' test [36, p. 117], and their progeny at harvest. The average percentages of leaf roll infection for all the localities in 1953–4 were 0·89 in the mother tubers and 7·1 in the progeny, the corresponding figures for 1954–5 being 0·64 and 3·6, and for 1955–6, 0·58 and 0·9. This result was not paralleled by virus Y infection which in the first year increased from 0·047 to 0·14 per cent., in the second from 0·039 to 0·66, and in the third from 0·065 to 0·08. Augusta [36, p. 53], Apta, and Adelheid were very resistant to leaf roll; Benedikta, Maritta, Forelle, and Bona possessed good resistance; Agnes, Ackersegen, Oberarnb. Frühe, and Lerche were moderately susceptible; and Sieglinde and Suevia were susceptible. Sieglinde, Apta, Maritta, Forelle, and Oberarnb. Frühe were very resistant to streak; Lerche and Suevia had good resistance; Agnes was moderately susceptible; and Ackersegen, Bona, Augusta, Adelheid, and Benedikta were susceptible. From the tables presented it is clear that heavy soils and high nitrogen levels are conducive to virus infection. For the variety Apta resistance to leaf roll was shown to be determined by a factor for hypersensitivity.

Diercks (R.) & Sprau (F.). **Versuch zur Frage des Einflusses der Stickstoffdüngung auf Krankheitsbild und Ertrag verschieden stark abgebauter Kartoffelherkünfte.** [An experiment on the influence of nitrogen fertilization on the disease picture and yield of Potato stocks with different levels of degeneration.]—*Jb. bayer. Landw.*, 33, 1, pp. 37–46, 1 graph, 1956.

The trial here reported from the Nymphenburg Institute, Bavaria [cf. 35, p. 840], compared the effects of various levels of nitrogenous fertilization on potatoes exhibiting different degrees of virus infection. Tubers of the variety Oberarnb. Frühe, previously classified in seed-piece tests, were divided into four groups having 0, 5·5, 45·3 and 74·8 per cent. infected tubers, respectively, most of the infection being attributable to potato leaf roll virus. In a field trial 150 kg. lots from each group received ammonium sulphate at 15, 60, and 120 kg. per ha. For each level of application the yield fell with increasing infection, but the fall was disproportionate, with the result that the effectiveness of heavy applications increased with increasing infection. At the highest infection level (74·8 per cent.) nitrogen at 120 kg. per ha. gave a yield of 180 kg., compared with 80 kg. at 15 kg. per ha. With infection at 0·5 per cent. the yields were 280 and 195 kg., respectively, for the same nitrogen levels. A calculation of the profits in respect of the various combinations, however, showed that the greatest accrued from planting clean tubers and applying fertilizer at the highest level. The heavy applications masked virus symptoms, while with light applications these appeared early.

Alfieri (S. A.) & Stouffer (R. F.). **Evidence of immunity from virus S in the Potato variety Saco.**—Abs. in *Phytopathology*, 47, 1, p. 1, 1957.

In tests with specific antisera potato virus S [cf. 35, p. 480; 36, p. 117 *et passim*] was not detected in 45 plants of the potato variety Saco, nor in plants of this variety inoculated with the virus by grafted plugs or by abrasion, indicating this variety to be immune from the virus.

Kassanis (B.). **Serological relationship between Potato paracrinkle virus, Potato virus S and Carnation latent virus.**—*J. gen. Microbiol.*, 15, 3, pp. 620–628, 1956.

As a result of further studies at the Rothamsted Experimental Station the author submits evidence that potato virus S [35, p. 919], paracrinkle virus [loc. cit.], and carnation latent virus [35, pp. 100, 584] are serologically related although differing somewhat antigenically. He suggests that all three originated from a common aphid-transmitted ancestor, although only the last named is now transmissible by aphids (*Myzus persicae*). That viruses can acquire or lose transmissibility by a given

insect as a result of invasion of a new host has been shown by Black (abs. in *Phytopathology*, 43, p. 466, 1953) and others.

The author's results indicate many specific antigenic groups within paracrinkle virus and potato virus S, which by analogy with results obtained with potato virus X [29, p. 274] may fail to give mutual cross protection. No King Edward plant was found free from paracrinkle virus and no Arran Victory free from virus S [35, p. 708], minor variants of both viruses being detected. It is suggested that the symptom variations in Arran Victory plants grafted with King Edward scions [35, p. 868] reflect the degrees to which different isolates mutually interfere with multiplication, the degree of interference generally being slight.

ROLAND (G.). **Sur l'identification du virus A.** [On the identification of virus A.]—*Parasitica*, 12, 4, pp. 125–128, 1 fig., 1956.

In further studies at the State Phytopathological Station, Gembloux, Belgium, on the identification of potato virus A [35, p. 582], it was ascertained that sap inoculations of young plants of *Nicandra physaloides* gave good symptoms provided there was a relatively high concentration of the virus in the inoculum. Sap inoculations of detached leaves of *Solanum demissum* EBS 99 in damp Petri dishes kept at laboratory temperature gave as satisfactory results as *S. demissum* S. Anti-A serum [cf. 25, p. 250] on sap-inoculated tobacco plants also proved successful with a high concentration of the virus.

RICHARDSON (D. E.) & TINSLEY (T. W.). **Lucerne mosaic virus in Potato—a new record for the British Isles.**—*Plant Path.*, 5, 4, pp. 133–134, 1 pl., 1956.

When seed potatoes were being tested for the presence of potato virus X at the National Institute of Agricultural Botany, Cambridge, in 1954, two leaf samples were found, by the symptoms [which are described] produced on various hosts, to contain a strain of lucerne mosaic virus [cf. 35, pp. 481, 868]. The samples had been taken from apparently normal plants of Ulster Premier and Majestic growing in County Antrim, Northern Ireland, in a locality remote from other potatoes and where relatively few aphids are present.

Evidence obtained indicated that most well-known British potato varieties tolerate infection and show few, if any, symptoms. The virus survives in only a few of the tubers and is unlikely to spread rapidly. Inoculation to tobacco or *Datura* spp. produces symptoms readily confused with those of potato virus X, but the Prince variety of French bean [*Phaseolus vulgaris*] produces distinctive lesions.

HIRST (J. M.) & STEDMAN (O. J.). **The effect of height of observation in forecasting Potato blight by Beaumont's method.**—*Plant Path.*, 5, 4, pp. 135–140, 2 diags., 1956.

To compare the value of readings made within the crop and in Stevenson screens for Beaumont's method of forecasting outbreaks of potato blight (*Phytophthora infestans*) [27, p. 88; 36, p. 54] distant reading thermographs were used at Rothamsted Experimental Station from 1951 to 1955, connected with wet- and dry-bulb thermometers placed either in a screen above the potato crop or in the crop, midway between ridges. Hourly or two-hourly records of temperature and relative humidity at Rothamsted were compared with those from thermographs in screens elsewhere. To find how often relative humidity was 90 per cent. or more the use of a transparent grid, which is described and figured, in conjunction with the thermograph charts, enabled direct assessment of the relative humidity from the wet- and dry-bulb pen traces.

The data obtained showed that while readings within the crop often forecast blight outbreaks more reliably than those in the screen, the differences varied from

year to year. Critical periods occur at both crop- and screen-height in warm, humid periods. Early in the season such periods recorded in the crop may differ from those in the screen owing to the proximity of exposed dry soil, which heats quickly. Later in the season high humidity may persist close to wet soil protected by dense foliage. Such conditions are unlikely to be detected by instruments placed 4 ft. above ground-level.

As neither method is perfect, widespread use of crop instruments does not appear to be justified, but establishing a supplementary crop station in each important potato-growing area in Great Britain would be an improvement on screen forecasting alone.

Williams (P. G.), Wade (G. C.), & Cartledge (E. Gwenda). **Late blight of Potatoes in Tasmania.**—*Tasm. J. Agric.*, 27, 3, pp. 229–235, 2 figs., 1 graph, 1956.

Late blight [*Phytophthora infestans*: 34, p. 742] of potato was unusually destructive during the 1955–6 season in Tasmania. Zineb (2¼ lb. per acre), manzate (1½ lb.), or colloidal copper (½ gal.) are recommended for control. Bordeaux mixture (4–2–40) has greater persistence but causes a slight reduction in yield in the absence of the disease. Copper dust, though generally less convenient, is effective on steep slopes where spraying is impracticable.

Bazán de Segura (C[onsuelo]). **Verticilliose of Potatoes in Peru.**—*Plant Dis. Reptr*, 40, 12, p. 1091, 1956.

In 1956 *Verticillium albo-atrum* was isolated from potato plants in the central coastal area of Peru with wilt symptoms similar to those produced by the same pathogen on cotton [34, p. 722]. In combination with *Fusarium* spp. it was associated with the production of aerial tubers.

Rosser (W. R.) & Jones (Moyra). **A Potato gangrene trial in the West Midlands.**—*Plant Path.*, 5, 4, pp. 148–149, 1956.

At Wolverhampton 100 tubers each of Craigs Royal potatoes (from a consignment of Scotch A seed) severely and slightly infected by *Phoma foveata* [32, p. 504] and 100 uninfected tubers from another source were planted by the National Agricultural Advisory Service in May, 1953, in land not previously cropped with potatoes. The crop from the infected tubers and the subsequent season's crop from the tubers harvested in 1953 remained uninfected. The rainfall for the three months August to October 1954 was 9·8 in. as compared with an average of 7·4, and October was the wettest since 1903, so that wet weather did not seem to favour the disease as in Scotland [loc. cit.].

Wolcott (A. R.). **Varietal response to climate and culture as related to the development of internal browning in Potato tubers.**—*Diss. Abstr.*, 16, 5, pp. 844–845, 1956.

In 20 potato varieties and seedling lines grown in accordance with various cultural practices in muck soils in northern Indiana internal browning developed under conditions of fluctuating tuber and haulm growth, which are known to promote the resorption of stored materials from the tubers [cf. 35, p. 923]. Fluctuating high temperatures in the short days of September were conducive to severe internal browning. Early necrotic symptoms found in August were of the internal brown spot type, ranging from diffuse flecking to irregular blotches and large central lesions. At the time the haulms were changing colour injury was of the corky ringspot type. Necrosis with scattered cavities (canker type rust spot) was found after the death of the tops.

YAMAGUCHI (M.), SEGELMAN (G.), & LIPPERT (L. F.). **Potato hair sprout.**—*Calif. Agric.*, 10, 10, p. 13, 2 figs., 1956.

Potato tubers in California with hair sprout [23, p. 454] have a significantly reduced respiration rate, which may explain their good storage qualities. Chemical analysis of hair sprout tubers of the variety White Rose revealed a content of 0·55 per cent. reducing sugars and 1·15 per cent. total sugars, compared with 0·18 and 0·26 per cent., respectively, for normal tubers. Affected tubers of this variety were found to have a low specific gravity, such that all but 5 per cent. were detectable by flotation in brine of specific gravity 1·065. Tubers of high sugar content are known to turn dark brown when used for potato chip production (which takes 15 per cent. of the total crop in the United States), and hair sprout may be responsible for part of those reacting in this manner.

ELMER (O. H.). **Sweetpotato mosaic.**—Abs. in *Phytopathology*, 47, 1, p. 9, 1957.

Sweet potato mosaic virus [33, p. 444] was transmitted to tobacco by sap from fleshy roots, but not from leaves, stems, or fibrous roots [in ? Kansas]. After sprout grafting foliar symptoms first appeared in the sprouts from tubers of the grafted plants, which were themselves symptomless. Sap from infected tobacco induced mosaic symptoms in tobacco, tomato, and *Gomphrena* markedly, and *Vinca* and *Zinnia* mildly. Local lesions formed on *Nicotiana glutinosa, N. rustica, Petunia,* and eggplant; [chilli] pepper seedlings were killed. In tobacco sap the dilution end point of the virus is 10^{-6}, it remains infective after 10 mins. at 85° C., but not at 90°, and its longevity at room temperature is at least 67 days.

CHEREWICK (W. J.). **Studies on seed-borne microflora and the effect of seed treatment of Rice.**—*News Lett. int. Rice Comm.* 14, pp. 1–5, 1955.

The information on fungus diseases of rice seed in Malaya given in this contribution has already been noticed from another source [34, p. 251].

ANDAL (MISS R.) & SUBBA RAO (N. S.). **Amino acid changes in the healthy and 'foot-rot' infected Rice (Oryza sativa L.)**—*J. Indian bot. Soc.*, 35, 4, pp. 414–416, 1956.

In further studies at the University Botany Laboratory, Madras, on foot rot of rice (*Fusarium moniliforme*) [*Gibberella fujikuroi*: 36, p. 209], when plants of the resistant variety GEB.24 and the susceptible MTU.9 were grown in sterilized, infested and non-infested soils, increase in age did not alter the free amino acid composition of the roots or shoots of either variety, though lysine was present 12 days after germination in the shoots of GEB.24. Glutamic acid, tyrosine, methionine, tryptophane, and lysine were present in the roots of both varieties six and 12 days after germination, but at both age levels the roots of MTU.9 also contained alanine and aspartic acid. The shoots of MTU.9 contained proline, though it was not present in those with a typical 'bakanae' effect (elongation of aerial parts). Plants with leaf chlorosis but little 'bakanae' contained serine, glycine, and phenyl alanine in place of glutamic acid, proline, and methionine present in the healthy controls.

PUSHPANADEN (PADMABAI). **Ascorbic acid and helminthosporiose of Oryza sativa L.**—*Curr. Sci.*, 26, 1, p. 26, 1957.

At the University Botany Laboratory, Madras, the ascorbic acid [vitamin C] content of rice plants was found to increase steadily with age, but to be lower in varieties susceptible to leaf spot (*Helminthosporium oryzae*) [*Ophiobolus miyabeanus*: 36, p. 209] than in resistant varieties [cf. 33, p. 248]. Since the content is correlated with cellular activity, the resistant varieties apparently have a higher metabolic rate.

Orsenigo (M.). **Produzione di tossine da parte di Helminthosporium oryzae Breda de Haan. Parte I.** [The production of toxins by *Helminthosporium oryzae* Breda de Haan. Part I.]—*Ann. Sper. agr.*, N.S., 10, 5, pp. 1745–1762, 2 figs., 1956. [English summary.]

In studies at the Regional Phytopathological Observatory, Milan, and the Institute of Plant Pathology of the Catholic University, Piacenza, Italy, experimental evidence was obtained which demonstrated that in culture *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: 35, p. 715] liberates toxins which reduce the germinability of rice seeds and produce abnormalities in the seedlings [cf. 7, p. 668; 13, p. 256]. Toxic activity was greatest at 16° to 19° C.

Pieris (W. I.). **Sulphur dusting of Rubber smallholdings in 1956.**—*Quart. Circ. Rubb. Res. Inst. Ceylon*, 32, 1–2, pp. 18–24, 2 pl., 1956.

The dusting scheme for the control of leaf fall of *Hevea* rubber in Ceylon [36, p. 123] caused by *Oidium* [*heveae*: 35, p. 790] was reorganized in 1956. Dusting machines and essential supervision (part-time) were supplied free, but owners were required to form groups and carry out the work on a co-operative basis. The scheme was limited to plantations of under 100 acres and preferably to those of under 30 acres. One group consisted of the owners of such lands as could be dusted with one machine operating from 6 to 9.30 a.m. on six days a week. Sulphur was supplied to each group at the rate of 60 lb. per acre for five applications, costing just over Rs. 12.

The over-all cost per acre averaged approximately Rs. 18, including everything except the expense of the machines and the departmental supervision. Substantial saving was effected as compared with 1955 by reduced expenditure on departmental supervision and travelling, transport of machines, etc. The results were very satisfactory. Extension of the dusting period to at least six hours a day is recommended.

Gilman (J. C.). **A manual of soil fungi.**—Second edition, x+450 pp., 14 pl., 153 figs., Ames, Iowa State College Press, 1957. $7.50.

This handbook [cf. 24, p. 287] has been revised and brought up to date. Additional isolates are described, extending the list of species to over 700. As a further aid to identification 85 photomicrographs have been included.

Guillemat (J.) & Montégut (J.). **Contribution à l'étude de la microflore fongique des sols cultivés.** [A contribution to the study of the fungal microflora of cultivated soils.]—*Ann. Inst. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 7, 3, pp. 471–540, 1 diag., 6 graphs, 1956.

In studies conducted, with the technical collaboration of Mme Montégut, at the National School of Agriculture, Grignon, France, soil samples were taken at five different depths (5 to 80 cm.) on four dates during the period June to September, 1955, from four experimental plots cultivated since 1875 and sown with either beetroot or wheat since 1931. Nearly 8,000 colonies were isolated on Czapek agar, dahlia agar (for ascomycetes), hemp seed, and pieces of carrot (for phycomycetes) and 156 species identified. The commonest and most ubiquitous species was *Penicillium lilacinum*, followed by *Mortierella renispora*. The most frequent pathogenic fungus was *Verticillium* sp. (like *V. albo-atrum*); *Fusarium bulbigenum* and *F. solani* were next [cf. 36, p. 59].

From the data obtained it is concluded that in attempting to classify fungi according to the depth below the soil surface at which they are found consideration must be given to the physical and chemical properties of the soil. A species may be said to be specific for depth only when its ability to survive anaerobically has been demonstrated *in vitro*. *Trichoderma lignorum* [*T. viride*] had its optimum

development at 5 cm., *F. bulbigenum* at 5 to 20 cm., *V.* sp. at 10 cm., and *F. solani* at 40 cm. The term 'soil fungus' may be applied with certainty to species that live only at a depth of 40 cm.; for other species the term is preferably to be applied only to those capable of appreciable growth at this depth. Among species living on the surface only, a distinction should be made between those whose presence depends strictly on fertilizers, or on cultivated or wild plants, or on plant debris.

Paharia (K. D.) & Kommedahl (T.). **The effect of time of adding suspensions in soil mycofloral assays.**—*Plant Dis. Reptr*, 40, 12, pp. 1029–1031, 1956.

At the Department of Plant Pathology and Botany, Institute of Agriculture, University of Minnesota, St. Paul, counts of soil fungi were made by incorporating a known quantity of soil suspension into an agar medium at the time of pouring plates or by distributing 1 ml. of the suspension on the solidified agar surface after two to three days. The latter method gave higher counts (an average of 19·9 colonies per plate compared with 11·3) regardless of the medium used.

Garren (K. H.), May (J. T.), & Walsh (C. S.). **Micro-organisms in nursery seedbed soils.**—*Tree Plant. Notes* 21, pp. 21–23, 1955. [Received December, 1956.]

In studies at the Agricultural Experiment Station, Auburn, Alabama, soil fungi isolated monthly on potato dextrose agar from mid May to mid August were grouped (by genera only) as cellulose-destroyers or antagonists (some being classifiable in both groups); many were pathogens. It was tentatively concluded that the incidence of cellulose-destroyers and antagonists increased sharply with rising temperatures, the increase of the latter being accompanied by a sharp decrease in root pathogens. Disappearing cellulose-destroyers were replaced by species of genera of the same physiological type, but the pathogens were replaced by both cellulose-destroyers and antagonists.

Koike (H.). **Studies on antibiotic production in soil.**—*Diss. Abstr.*, 16, 7, p. 1199, 1956.

In studies at Kansas State College soil samples of 200 gm. inoculated with pure cultures of antibiotic-producing organisms were maintained at 27° C. and 65 per cent. saturation in cotton-stoppered bottles, and at intervals the soil solution was displaced with alcohol, its antibiotic activity being assayed *in vitro* against *Pythium graminicola* by a modified paper disk method.

The antibiotic W-S was consistently produced in uninoculated Wabash silt loam supplemented with soybean meal, and was at a maximum with a 3 per cent. supplement. It differed in one or more [unspecified] characteristics from other antifungal antibiotics described in the literature. It is highly soluble in water and ethyl acetate; insoluble in several other [unspecified] organic solvents; stable at 99°, 27°, and 8°, and −18°, but unstable at 121° and in the dry state at room temperature. It was highly toxic to sugar cane seedlings and ineffective in controlling *P.* [*graminicola*] rot in them. Sorghum seedlings, however, were protected from the pathogen to a limited extent.

An actidione-producing strain of *Streptomyces griseus* failed to produce this substance in various soils [cf. 35, p. 325] with organic supplements. Actidione (25 and 50 p.p.m.) protected sugar cane seedlings from *P. graminicola* [cf. 29, p. 473]. There was no correlation between the ability of various actinomycetes to produce antibiotics *in vitro* and in soil.

With respect to the techniques employed it is reported that in the paper disk method bacterial growth was inhibited by mercuric chloride and streptomycin sulphate at concentrations of 0·625 and 20 μg per 0·1 ml. of assay solution, respectively. A new fritted filter-tube agar-plug method shows promise for quantitative measurement, though it is less sensitive than the paper disk method.

Gasser (R.) & Müller (G.). **Les traitements contre la chlorose des plantes.** [Treatments for chlorosis in plants.]—*C. R. Acad. Agric. Fr.*, 42, 14, pp. 713-717, 5 graphs, 1956.

The authors report the results of chelate treatments in 1953 for iron deficiency chlorosis [cf. 36, p. 256] in pear trees growing on heavy, poorly aerated clay soil of high lime status [cf. 35, p. 234] at Pfeffingen, Switzerland. Sequestrene NaFe, Chel 330 HFe (or iron diethylene triamino penta acetic acid) which gives better results than iron EDTA, and ferrous sulphate were more effective as soil treatments than as foliage sprays. For soil treatments watering with chelate solution was superior to incorporating a mixture of sand and chelate into the soil. RA 157 (10 gm. per tree) gave better results than Chel 330 HFe (60 gm.), RA 159 (20 gm.), or Chel 138 Fe (10 gm.). in soil treatments.

Farrar (L. L.). **A chemical test for ratoon stunting disease of Sugarcane.**—Abs. in *Phytopathology*, 47, 1, p. 10, 1957.

When 3 per cent. hydrogen peroxide is applied for 10 to 15 secs. to longitudinal sections cut from the periphery of mature basal nodes of sugar-cane, blotted off, and followed by concentrated hydrochloric acid, a blue-green colour appears after 20 to 30 secs. at leaf scar level in the tissues round the vascular bundles in healthy cane. In that affected by ratoon stunting virus disease [in Louisiana: 36, p. 62] this does not occur, or the colour reaction is limited to one or two bundles [cf. 35, p. 846].

Sheffield (F[rances] M. L.). **Ratoon stunting—a degeneration disease of Sugar Cane.**—*E. Afr. agric. J.*, 22, 2, pp. 70–72, 1956.

In this account of ratoon stunting disease of sugar-cane and its control [35, p. 845 *et passim*], with special reference to the conditions prevailing in East Africa, the author states that the disease is now widespread in Kenya [35, p. 277], Tanganyika Territory [35, p. 163], and Uganda [35, p. 277]. The virus has been detected in every commercial variety at present grown in Natal [35, p. 721], and though severity of attack varies in the different varieties, none is immune or highly resistant. All varieties imported into East Africa now are subjected to heat treatment when in quarantine [36, p. 352].

Some experiments on the leaf scorch of Sugar-cane caused by Stagonospora sacchari. —*Rep. Taiwan Sug. Exp. Sta.*, 13, pp. 81–113, 3 pl., 2 figs., 1955. [Received 1956.]

This contribution (published also as *Spec. Publ. Phytopath. Lab. Taiwan Univ.* 3) from a number of workers, presented by T. Matsumoto, reports studies on leaf scorch of sugar-cane [35, p. 634] in Formosa. Considerable attention was given to the production and behaviour of pycnidia in culture. Inoculation of dry potato-sucrose agar with a heavy spore suspension and incubation at 28° C. for 2 to 3 days, followed by a similar period at 31°, gave plentiful sporulating pycnidia, which could be kept at 10° to 15°.

In plants sprayed with a spore suspension and placed in infection chambers the spindle leaves were found to be the most susceptible and typical streak symptoms appeared on the developing leaves within a month or so. Infection was favoured by humidity, and under natural conditions the spread of the disease is considerably checked by dry weather, although streak formation was accelerated by it. In nature the pycnidia are produced chiefly on the upper leaves but their formation and situation is largely governed by humidity. Under moist conditions the spores germinate readily on the leaves, the hyphae entering the guard cells; subsequent intercellular growth in the mesophyll leads to penetration of the bundle sheath and entry into the xylem vessels.

Subramanian (C. V.). **Hyphomycetes—II.**—*J. Indian bot. Soc.*, 35, 4, pp. 446–494, 21 figs., 1956.

In this further contribution [35, p. 637] notes are given on the taxonomy and systematics of 29 hyphomycetes, mostly from India, including five new genera, eight new species, 16 new combinations, and one *nomen novum*.

Dingley (Joan M.) & Brien (R. M.). **New records of fungous diseases in New Zealand 1955–56.**—*N.Z.J. Sci. Tech.*, Sect. A, 38, 4, pp. 434–439, 3 figs., 1956.

New disease records included in this list from New Zealand [cf. 35, p. 236] are *Sorosphaera veronicae* on *Veronica tournefortii*, *Sphaerotheca humuli* var. *fuliginea* on *Coriaria angustissima* and *C. thymifolia*, *Puccinia iridis* on *Iris xiphium*, and *Alternaria zinniae* on *Zinnia elegans*. Among the new host records are *Elsinoe piri* on pear, *Oidium* sp. on dahlia, *Physalospora obtusa* on peach and raspberry, *Uromyces appendiculatus* on *Phaseolus coccineus*, and *Stagonospora curtisii* on *Hippeastrum* sp., *Nerine curvifolia* var. *fothergillii*, and *Nerine* sp.

Viennot-Bourgin (G.). **Mildious, oidiums, caries, charbons, rouilles des plantes de France. Texte. Plates.** [The mildews, oidiums, bunts, smuts, and rusts of plants in France. Text. Plates.]—*Encycl. mycol.*, 26, 317 pp.; 27, 98 pl., Paris, Paul Lechevalier, 1956. Fr. 18,000 (2 vols.).

In this important work, covering the Peronosporales, Erysiphaceae, Ustilaginales, and Uredinales on wild and cultivated plants in France, the text is arranged under the generic names of the hosts, presented in alphabetical order, the fungi being dealt with in the order given above. Each account of a fungus is followed by a list of the species attacked; for some, brief diagnoses are given, with spore measurements; for others, specific differentiations are presented in the form of keys. The second volume is devoted entirely to illustrations consisting of reproductions of original drawings by the author.

Baxter (J. W.). **Notes on Iowa rusts.**—*Proc. Iowa Acad. Sci.*, 62, pp. 94–97, 4 figs., 1955. [Received March, 1957.]

Studies at Iowa State College, Ames, showed that *Aecidium yuccae* is connected with *Puccinia amphigena*. Plants of *Yucca glauca*, inoculated in the spring with the overwintered teleuto material of *P. amphigena*, produced pycnia on the 15th May and aecidia on and after the 25th. Aecidia also appeared on six-months-old *Yucca* plants inoculated outdoors. A connexion was indicated, also, between the aecidia on *Aesculus glabra* and *P. andropogonis* on *Andropogon gerardi*.

Uredospores of *P. flaccida*, recorded on *Echinochloa pungens* in 1954, were used to inoculate *E. crus-galli*, which responded by abundant production of uredosori.

Ramakrishnan (T. S.) & Seethalakshmi (V.). **Studies on the genus Phytophthora. IV. New hosts for P. palmivora from South India.**—*Proc. Indian Acad. Sci.*, Sect. B, 44, 2, pp. 79–84, 3 figs., 1956.

In this study at the University of Madras [cf. 36, p. 402] strains of *Phytophthora* isolated in Coimbatore, India, from *Areca lutescens* (bud rot), *Bougainvillea spectabilis* (leaf and flower blight), *Capsicum grossum* (fruit rot), *Hibiscus esculentus* (flower and fruit wet rot), and *Mimusops hexandra* (severe seedling blight) were all referred to *P. palmivora*. Three were homothallic and two heterothallic. Though the isolates varied in pathogenicity to the hosts cited above and other common hosts of *P. palmivora*, all were pathogenic to *Ricinus communis*.

Doguet (G.). **Le genre Thielavia Zopf.** [The genus *Thielavia* Zopf.]—*Rev. Mycol., Paris*, 21, *Suppl. colon.* 1, pp. 1–21, 4 pl., 1956.

After briefly summarizing the chief characters of the genus *Thielavia*, the author

presents an account of his studies on *T. terricola* [10, p. 56] and *T. setosa* (*Trans. Brit. mycol. Soc.*, 21, pp. 16–28, 1937). The material of *T. terricola* was isolated from disintegrating electrical insulating material in French Equatorial Africa. The fungus grew readily on all media; cultures are grey, short white hyphae forming over very numerous black perithecia. The species is homothallic. The mature asci are claviform and measure 40 by 13 to 18 μ. The ascospores are 11 to 16 by 6·5 to 8 μ.

A parallel study of *T. setosa* was made from the type culture from Baarn.

Zambettakis (C.). **Phaeostagonosporopsis zeae (Schw.) Wor., ses variétés.** [*Phaeostagonosporopsis zeae* (Schw.) Wor.: its varieties.]—*Rev. Mycol., Paris*, 21, *Suppl. colon.* 1, pp. 31–36, 1 fig., 1956.

At the Natural History Museum, Paris, a study of *Diplodia macrospora*, *D. maydis*, and *D. zeae* [15, p. 118] from numerous herbaria and some fresh material on maize from French Equatorial Africa and in culture showed that the fungus is not a typical member of the caulicolous Phaeodidymae [35, p. 237] or a true member of the Phaeophragmiae, and therefore the names *Diplodia* or *Hendersonia* are unsuitable for it. The author selects the name *Phaeostagonosporopsis* in preference to *Stenocarpella* for reasons of etymology, as it indicates the transition from the Phaeodidymae to the Phaeophragmiae. The absence of a mucilage in the pycnidium and of a surrounding stroma separates the organism from *Macrodiplodia* and *Dothiora*. As the author believes the specific epithet *zeae* to be the earliest, he accordingly adopts the terminology of Woronichin and refers the fungus to *Phaeostagonosporopsis zeae* [*Diplodia maydis*]; two varieties, *microspora* and *macrospora*, may be identified, the former with spores 22 to 28 by 4 to 5 μ, and the latter (50 to) 60 to 85 (to 94) by 7 to 10 (to 12) μ.

Nicot (Jacqueline) & Leduc (Agnès). **Mise en évidence d'un mucilage dans la paroi des spores du Trichothecium roseum.** [Demonstration of a mucilage in the wall of the spores of *Trichothecium roseum*.]—*C. R. Acad. Sci., Paris*, 244, 10, pp. 1403–1405, 3 figs., 1957.

It has been shown [at the Natural History Museum, Paris] that the mucilaginous substance which ensures the cohesion of the conidia of *Trichothecium roseum* at the apex of the conidiophore is of a complex nature, consisting of callose and cellulose (or more probably chitinous) compounds. Of the various reagents used for the demonstration of the mucilage, Waterman's black or blue-black ink proved particularly helpful in the analysis of the spore wall structure.

Pont (W.). **Tobacco diseases in Queensland.**—*Qd agric. J.*, 82, 11, pp. 635–640, 3 figs.; 12, pp. 675–682, 4 figs., 1956.

A detailed description is given of tobacco blue mould (*Peronospora tabacina*) [19, p. 459; 27, p. 275; 35, p. 162], its symptoms, spread, and control under North Queensland conditions. The most serious aspect now is its occurrence in the field after planting out, causing leaf losses every year. It can occur any time during the growth season and has often been serious in the past on winter crops. Disease-free seed is obtainable from the Department of Agriculture and Stock. Seed-bed treatment with benzol [benzene: 21, p. 505] should start on germination and not later than 10 to 14 days afterwards; in north Queensland it should be applied every third night and in the south-west every night. Board or iron covers are recommended instead of calico. Complete control in the seed-bed should be ensured to avoid introduction of infected seedlings into the field, where control with fungicides is difficult. Breeding of resistant varieties is in progress.

The second article deals with tobacco mosaic virus, frog-eye leaf spot (*Cercospora nicotianae*) [19, p. 459], [unspecified] damping-off, and stem rots caused by

Rhizoctonia [*Corticium*] *solani* and *Sclerotium rolfsii* [27, p. 47]. The control recommended for frog-eye includes seed sterilization by a 15-minute immersion in 1 in 1,000 aqueous silver nitrate solution followed by a rinse in clean water, destruction of all plant refuse, and spraying at 5-day intervals with home-made cuprous oxide or Bordeaux mixture. Priming may be helpful but only if the primed leaves are removed from the field. The appearance of damping-off in a seed-bed should be dealt with immediately. A drench of thiram (1 oz. of 80 per cent. in 4 gals. water) is recommended if the root is shrivelled and rotten; if the seedlings are rotted at ground level but the root is healthy, a drench of captan (1¼ oz. of 50 per cent.) is better, both at ½ to 1 gal. per sq. yd. of seedbed.

Stem rots are best prevented by rotational planting.

Pavillard (J.) & Beauchamp (Charlotte). **La constitution auxinique de Tabacs sains ou atteints de maladies à virus : présence et rôle de la scopolétine.** [The auxin constitution of healthy Tobaccos or those infected by virus diseases: presence and function of scopoletin.]—*C. R. Acad. Sci., Paris*, 244, 9, pp. 1240–1243, 5 graphs, 1957.

Scopoletin [28, pp. 199, 537] was shown by chromatograms in ultra-violet light to be a normal component of healthy tobacco. Under the influence of pathological factors, such as viroses (including mosaic) and albinism, its content is substantially increased at the expense of the indole acetic acid.

Watanabe (I.) & Ui (N.). **Electrophoretic studies of Tobacco mosaic virus.**—*Bull. chem. Soc. Japan*, 29, 3, pp. 345–350, 1 fig., 1 graph, 1956.

Variations in the mobility of tobacco mosaic virus in phosphate buffer at pH 7·7 with changes in concentration and ionic strength were investigated at the Institute of Science and Technology, University of Tokyo, Japan. Mobility was independent of the concentration, but increased greatly with a decline in ionic strength.

Buzzell (Anne), Trkula (D.), & Lauffer (M. A.). **X-ray studies on Tobacco mosaic virus.**—*Arch. Biochem. Biophys.*, 63, 2, pp. 470–476, 2 graphs, 1956.

At the Department of Biophysics, University of Pittsburgh, Pennsylvania, the 37 per cent. survival dose for inactivation of tobacco mosaic virus by X-rays [35, p. 638] was found to be $2{\cdot}3 \times 10^5$r, which corresponds to a target volume about $\frac{1}{12}$ that of the anhydrous particle and closely comparable to the nucleic acid volume. Evidence is presented in support of the view that X-ray inactivation [36, p. 136] is an all-or-none reaction.

Bancroft (J. B.) & Curtis (R. W.). **A simple method using trichloroacetic acid for estimating Tobacco mosaic virus concentration.**—*Phytopathology*, 47, 2, pp. 79–82, 2 graphs, 1957.

From Purdue University, Lafayette, Indiana, the authors describe a method of assaying tobacco mosaic virus spectrophotometrically [cf. 32, p. 699] at 260 mμ, which does not involve using an ultracentrifuge. Trichloracetic acid (2 M) [cf. 34, p. 264] is used to precipitate the nucleoprotein from cleared sap at room temperature, with subsequent hydrolysis of the precipitate in 0·3 M for 15 min. at 90° C. The method proved suitably selective for virus, but not for host products that absorb at 260 mμ, and as satisfactory as the standard methods used hitherto.

Nixon (H. L.). **An estimate of the number of Tobacco mosaic virus particles in a single hair cell.**—*Virology*, 2, 1, pp. 126–128, 1 fig., 1956.

In the Plant Pathology Department, Rothamsted Experiment Station, the number of virus particles in a single hair cell of a White Burley tobacco plant systemically infected by tobacco mosaic virus [35, p. 584] was estimated to be

6×10^7 in a volume of 250,000 μ^3 by counting the particles in a known volume of the sectioned cell by means of the electron microscope.

Welkie (G. W.) & Pound (G. S.). **Manganese nutrition of Nicotiana tabacum in relation to multiplication of Tobacco mosaic virus.**—Abs. in *Phytopathology*, 47, 1, p. 36, 1957.

In tobacco plants with tobacco mosaic virus [36, p. 135] grown in a complete nutrient solution except for manganese [at the University of Wisconsin] there was less chlorosis than in uninfected plants; virus symptoms were less marked than in plants receiving complete nutrient. Manganese deficient plants had 50 per cent. more virus per unit weight of tissue than those with manganese, and a greater fresh weight, lower dry weight, and nearly 40 per cent. less nitrogen.

Harrison (B. D.). **A strain of Tobacco mosaic virus infecting Plantago spp. in Scotland.**—*Plant Path.*, 5, 4, pp. 147–148, 1956.

This paper on a strain of tobacco mosaic virus found in *Plantago major* and *P. lanceolata* in Scotland, considered to be similar to Holmes's rib grass strain [21, p. 227] gives a full account of observations already noticed from another source [35, p. 874].

Mondoñedo (J. R.). **Tobacco mosaic and its control.**—*Philipp. Agric.*, 39, 3, pp. 109–116, 1955. [Received January, 1957.]

This is a concise review of the symptoms, cause, host-range, and control of tobacco mosaic virus disease, which has recently become a serious problem in Philippine tobacco plantations [6, p. 191].

McRitchie (J. J.). **Pathogenic strains of Tobacco mosaic virus on Tomato.**—Abs. in *Phytopathology*, 47, 1, pp. 23–24, 1957.

Using purified preparations of tobacco mosaic virus strains from ten sources and inoculating these into nine varieties and species of tomato [cf. 36, p. 139], including CStMW18 [36, p. 283], the virus strains differentiated into three groups: (1) producing visible symptoms on standard varieties but none on CStMW18, which remained free from virus; (2) producing no visible symptoms on CStMW18, but on assay these plants and the standards were found to contain virus; and (3) producing visible symptoms on all the plants.

Best (R. J.) & Gallus (H. P. C.). **Further evidence for the transfer of character-determinants (recombination) between strains of Tomato spotted wilt virus.**—*Enzymologia*, 17, 4, pp. 207–221, 6 pl., 2 graphs, 1955. [German summary. Received November, 1956.]

Much of the information in this further account of recombination between strains of tomato spotted wilt virus in mixed infections on tomato, tobacco, and *Nicotiana glutinosa* has already been noticed [34, p. 553]. It is concluded that the virus particles carry determinants which govern their reaction with the host plant, and that these determinants can be interchanged. Thus, one recombinant formed in tomato resembled the parent strain *A* in producing systemic leaf necrosis in tomato and *E* in invading *N. glutinosa* systemically, but differed from *A* in failing to cause apical necrosis in tomato and from *E* in producing no primary yellow blotches on *N. glutinosa* leaves.

Rich (A. E.) & Yeager (A. F.). **New Hampshire Surecrop—a new Tomato variety highly resistant to late blight and moderately resistant to early blight.**—Abs. in *Phytopathology*, 47, 1, p. 28, 1957.

New Hampshire Surecrop tomato, developed at the Agricultural Experiment Station, is highly resistant to tomato race 0 and common field strains of *Phytophthora infestans* and is moderately resistant to *Alternaria solani*.

Day (P. R.), Jenkins (J. E. E.), & Wilcox (H. J.). **A search for resistance to Didymella lycopersici in the Tomato.**—*Plant Path.*, 5, 4, pp. 150–151, 1956.

In two tests carried out at Anstey Hall, Cambridge, in September and October, 1953, and May to August, 1954, 23 lines of *Lycopersicon pimpinellifolium*, ten of tomato, four of *L. peruvianum*, two of *L. hirsutum*, and one of *L. glandulosum* were screened for resistance to *Didymella lycopersici* [cf. 36, p. 138 *et passim*], the susceptible variety Potentate being used as control.

In both tests the plants were grown in infested soil, and in the second were watered with a spore suspension after three months. Survivors were finally wound-inoculated in the stem after two and four months in the two tests, respectively. Tomato and *L. pimpinellifolium* both proved highly susceptible to soil inoculation; none of the lines resisted wound-inoculation, and they, therefore, hold little promise for breeding purposes.

Scheffer (R. P.). **Grafting experiments with Fusarium wilt resistant and susceptible Tomato plants.**—Abs. in *Phytopathology*, 47, 1, p. 30, 1957.

The tomato varieties Bonny Best, susceptible, and Jefferson, resistant to wilt (*Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici*) [35, p. 50] were approach-grafted, and subsequently the top or bottom of one member of the pair was severed to give the following combinations:—(1) susceptible scion on resistant stock, (2) susceptible on susceptible, (3) resistant on susceptible, and (4) resistant on resistant [cf. 35, p. 928]. The pathogen was then introduced in suspension through the spurs of the scions. Typical symptoms developed on (1) and (2); (3) and (4) were symptomless but for some flagging of top leaves in (3) where the fungus had caused vascular dysfunction in the stock. Susceptibility does not, therefore, appear to depend on root produced factors; resistance is present in stems and is similar to that in roots.

Pegg (G. F.). **A hyaline variant of Verticillium albo-atrum pathogenic to Tomato plants.**—*Phytopathology*, 47, 1, pp. 57–58, 2 figs., 1957.

From Wye College, Kent, England, the writer describes a new hyaline strain of *Verticillium albo-atrum* isolated from tomato [29, p. 333 and next abstract] and very similar to *V. intertextum* [35, p. 56], from which, however, it differs in the size and shape of the coremia and phialospores, in the degree of pigment formation in daylight, and in its pathogenicity to tomato. It appeared also in sectors of a normal culture from tomato. Unlike other hyaline variants it does not regain its pigment on transfer to potato dextrose agar.

Edgington (I. V.) & Walker (J. C.). **The influence of soil and air temperature on Verticillium wilt of Tomato.**—Abs. in *Phytopathology*, 47, 1, p. 8, 1957.

In studies [at Wisconsin Agricultural Experiment Station] microsclerotial isolates (M type) of *Verticillium albo-atrum* were found to have higher optimum and maximum temperatures than non-microsclerotial isolates (NM type) in culture. Tomato plants 4- to 5-in. high in soil at 20°, 24°, and 28° C. and at air temperatures of 16°, 20°, 24°, and 28° were inoculated and observed for wilt incidence at 16 to 19 days. At 20° and 24° soil and 16°, 20°, and 24° air, variously combined, both isolates caused severe wilt. At 28° soil and air temperature only the M type caused wilt. The NM type caused moderate wilt at 28° air with soil at 20° and 24°. Soil temperature was therefore a more important factor in disease development than air.

Husain (A.) & Kelman (A.). **Presence of pectic and cellulolytic enzymes in Tomato plants infected by Pseudomonas solanacearum.**—*Phytopathology*, 47, 2, pp. 111–112, 2 graphs, 1957.

At North Carolina State College, Raleigh, Rutgers tomato plants were hypo-

dermically inoculated with *Pseudomonas solanacearum* [34, p. 438] and the wounds protected from contamination. Isolations made 10 days later showed the presence of bacteria other than *P. solanacearum* in only five of 40 plants sampled, and then in very low numbers. Enzyme assays of non-contaminated wilted plants showed in three trials significant cellulase (Cx) and polygalacturonase activity but none in healthy plants, indicating that the parenchymatous breakdown characteristically induced in tomato by this pathogen is attributable to the production by it of the above enzymes in the host in the absence of secondary bacteria [cf. 35, p. 334].

Coe (D. M.) & Conover (R. A.). **B-622 as a control for gray leaf spot of Tomato.**—*Plant Dis. Reptr*, 40, 12, pp. 1084–1086, 1956.

In field trials in Florida in 1955–6 B-622 (2,4-dichloro-6-(O-chloroanilino)-S-triazine, Chemagro Corp.) gave outstanding control of grey leaf spot (*Stemphylium solani*) on Homestead tomatoes [35, p. 494] with no evidence of phytotoxicity. At Fort Pierce the percentage defoliation was reduced from between 90 and 95 (untreated) to less than 5 by seven weekly applications at 3 lb. per 100 gals. from 16th March. At Homestead the average number of lesions per leaflet was reduced from 61 (untreated) to 3 by 2 lb. per 100 gals. at 5-day intervals from 14th December to 3rd February, then at 3 lb. three times a week until 24th February. Against *Phytophthora infestans*, however, B-622 was inferior to the recommended schedule of alternating maneb and zineb [loc. cit.].

Levisohn (Ida). **Observations on the mycorrhizal habit of forest trees.**—*Emp. For. Rev.*, 36, 1, pp. 85–90, 4 figs., 1957.

Examination of hundreds of samples of root material from forest trees at home and abroad, carried out at Bedford College, University of London [cf. 34, pp. 169, 802], indicated that all forest trees are potentially mycorrhiza-formers. The only exceptions were in the genus *Eucalyptus* [cf. 35, p. 477]. *Ginkgo biloba* and *Metasequoia glyptostroboides* formed endotrophic mycorrhiza under widely contrasting soil conditions. Regular endotrophic infection was also present in all leguminous forest trees examined, as well as in nodule-bearing, non-leguminous trees. *Populus* is usually ectotrophic, but seedlings of the hybrid *P. generosa* × *nigra charkowiensis* from Alice Holt [Surrey] bore infections of the endotrophic type. Mycorrhizal infection was found in only two of the 45 samples of *Eucalyptus* species from Australia, India, Ceylon, Cyprus, Israel, Italy, and Great Britain.

It appears from all these results that the type of association (ecto- or endotrophic) may vary within the family and the genus, and even among representatives of a given species. In the author's opinion the lack of mycorrhizal infection in fast-growing forest trees is possibly connected with a sugar deficit in the roots [24, p. 465], rapid growth not allowing carbohydrates to accumulate there.

A study of beech roots, excavated *in toto*, suggested that the type of fungal associations borne on the same root systems is determined by the character of the soil layers in which the root branches develop.

Bakshi (B. K.). **Fungal diseases of Khair (Acacia catechu Willd.) and their prevention.**—*Indian For.*, 83, 1, pp. 41–46, 2 pl., 1957.

Recent forest surveys in Dehra Dun, Ramnagar, Haldwani, and Tarai, and in the Bhabar Divisions of the Uttar Pradesh, India, revealed attacks on an alarming scale of *Fomes badius* [29, p. 592] on khair (*Acacia catechu*), an important cash-crop tree in India. The fungus causes a heart rot, rendering the tree industrially valueless. It is also pathogenic to *A. arabica*. It gains entrance through wounds, attacking trees as soon as the heartwood begins to develop, i.e., when the diameter reaches 4 in. Sporophores, developing readily and invariably on the stem within three years of infection, serve as an easy means of identifying the diseased trees.

Control consists in avoiding injury to the tree, growing *A. catechu* in mixture with shisham (*Dalbergia sissoo*), removing the fruiting bodies of the fungus, and salvaging the heartwood. The last is done by marking out and extracting as soon as the sporophores appear on green but diseased trees.

Other diseases, though of minor importance, attacking this tree are *Polyporus gilvus* [loc. cit.] and *Ganoderma lucidum* [cf. 31, p. 465], the former producing black zones on decayed wood. Both fungi invade the roots and eventually kill the plant, causing sponginess of the sapwood, their chief point of attack. Removal of diseased and dead trees and the use of mixed cropping are the most important measures of control.

Of the trees at present grown in plantations in Uttar Pradesh, the following in addition to *A. catechu* are susceptible to both *G. lucidum* and *P. gilvus*: *A. arabica*, *Acrocarpus fraxinifolius*, *Albizzia procera*, and *D. sissoo*; and to *G. lucidum* alone: *Azadirachta indica* and *Terminalia tomentosa*.

Item No. I.G.—Mortality in forest species.—*Proc. eighth silvic. Conf., 1951, Part I*, pp. 143–154; *Part II*, pp. 324–333, 1956.

In Part I of these proceedings are given summaries and discussions of the papers presented in Part II, all dealing with the death of *Casuarina equisetifolia* in India. Opening the subject, K. Kadambi briefly reviewed tree mortality in general, the work done on tree diseases and timber decay in India, and their control; much of this information has already been noticed from other sources [29, p. 591; 32, p. 158; 34, p. 498; 35, pp. 53, 405, 558]. In south India teak (*Tectona grandis*) seeds, stumps, standing trees, and service timber are stated to be free from wood decaying fungi.

The spike disease of sandal (*Santalum album*) [35, p. 497] is present in epidemic form in most of the sandal areas and is believed to be transmitted in nature by the insect *Jassus indicus*.

Salai (*Boswellia serrata*) [cf. 32, p. 38] is attacked by *Fomes rimosus*, *F. fastuosus*, *F. senex*, *Hexagonia sulcata*, and *Trametes incerta*. These fungi enter the tree through fire scars and cause heart rot which manifests itself externally by bulbous and swollen bases and bottle-shaped stems in immature trees.

Peridermium cedri [35, p. 558], which causes witches' broom and finally die-back on cedar, was found to be autoecious. On deodar (*Cedrus deodara*) the fungus is controlled by removing diseased parts.

F. pini is reported on blue pine (*Pinus excelsa*) [29, p. 592] from the Seraj division, Punjab, and from four out of eight divisions in Kashmir. The high rate of infection of blue pine is probably due to heavy lopping of the trees.

Chestnut blight (*Endothia parasitica*) [29, p. 441] is reported from Ranikhet, Uttar Pradesh. Immediate identification of the disease and eradication of affected trees are recommended.

In part II R. S. Gupta (pp. 324–328), dealing with soil in relation to casuarina mortality, states that despite the serious menace of *Trichosporium vesiculosum* [30, p. 638] the fungus alone is not entirely responsible for the death of the trees, moisture conditions and the morphology of the soil profile also contributing to the casualties.

I. M. Qureshi reports (pp. 329–330) on the dying of *Casuarina equisetifolia* in young plantations along the coastal tracts of Bombay State. *Macrophomina phaseoli* and *T. vesiculosum* were isolated, the former from wilted seedlings collected all over the Karwar plantations; the latter did not occur on any alarming scale nor at the seedling stage.

B. K. Bakshi (pp. 330–331) reviews the two main reasons for the death of the trees and the best methods of control [30, p. 637].

On pp. 332–333 K. Kadambi reports observations over a number of years in

Mysore, particularly on the control of *T. vesiculosum* by deep irrigation within an irrigated plantation where water supply was inadequate.

Sinha (R. L.). **Mortality of 'Sal' in Gorakhpur Forest Division, Uttar Pradesh.**—*Indian For.*, 83, 1, pp. 47–53, 1957.

In 1952 there was an unprecedented, widespread mortality of sal trees [*Shorea robusta*] of all ages in the sal forests throughout the Gorakhpur Forest Division, Uttar Pradesh. Die-back is the typical symptom in bigger trees whereas wilting is a predominant feature preceding the death of saplings and trees at the pole stage. The root rot fungus, *Polyporus shoreae* [32, p. 158; cf. 34, p. 619], was found to be endemic in the area, particularly in the moist type of sal in low lying areas which are sometimes inundated by flood water.

There is a possibility that the top soil layers have become impoverished, the drier and impervious layer below preventing the healthy development of the typical tap root. Both the absence of undergrowth and the poor rainfall for several years have increased the moisture deficiency in the area. It is suggested that the situation might be improved by growing and maintaining a ground vegetation of mixed shrubs, herbs, and small trees and of miscellaneous second-storey species; leaving slash, debris, and leaves on the ground to conserve moisture; decreasing or controlling grazing with closure of some overgrazed areas to encourage the growth of the ground flora; restricting repeated burning and cutting back of sal coppice and taungye crops to invigorate the root system which may actually be harmed by burning; decreasing drought effects, especially by contour trenching which will check and retain the water 'run-off'; and removing as soon as possible dead or dying trees.

Findlay (W. P. K.). **Durability of African Mahogany—Khaya ivorensis.**—*Emp. For. Res.*, 36, 1, pp. 91–93, 1957.

In tests at the Forest Products Research Laboratory, Princes Risborough, sample pieces (10 by 2·5 by 1·25 cm.) of *Khaya ivorensis*, taken from logs from Nigeria, lost on the average after four months' decay by *Merulius lacrymans* at 22° C., 0, 2·7, and 11·5 per cent. dry weight in the outer, intermediate, and inner zones of the heartwood, respectively, samples from Ghana losing 4·8, 8·3, and 11·5 per cent. With *Coniophora cerebella* [*C. puteana*] the corresponding figures were 5·1, 4·9, and 33·7 per cent., and 8·7, 13·9, and 15·5 per cent.; for *Polystictus versicolor* they were 2·2, 15·7, and 34·3 per cent., and 20·7, 30, and 33·8 per cent.; for *P. sanguineus* 1·4, 12·6, and 25·7 per cent., and 9·8, 15·1, and 17·3 per cent.; and for *Lenzites trabea* 0·9, 0·5, and 9·4 per cent., and 0·5, 3·1, and 6·6 per cent.

The solubility of material from the three zones expressed as a percentage of the dry weight of wood was, for the Nigerian material, 8·3, 6·2, and 4·2 per cent., respectively, and for that from Ghana 5·7, 3·9, and 3·4 per cent., respectively. It is apparent that the amount of water-soluble extractives was higher in the more durable outer zone and was highest in the Nigerian material, which was the most durable.

Material from the central zone of the heartwood of *K. ivorensis* should be classed as non-durable.

Heim (R.) & Moreau (C.). **Une moisissure des noix de Kola.** [A mould of Kola nuts.]—*Rev. Mycol., Paris*, 21, *Suppl. colon.* 1, pp. 37–38, 1956.

The mould on kola nuts received [at the Natural History Museum, Paris] from the Ivory Coast in polythene bags was mainly white mycelium of *Schizophyllum commune*, forming a fine skin over the nuts and on the bags. A yellowish mould penetrating the nuts was *Fusarium solani*.

Garren (K. H.). **Possible relation of Diplodia theobromae to leader dieback of Sweetgum suggested by artificially induced infections.**—*Plant Dis. Reptr*, 40, 12, pp. 1124–1127, 1956.

In investigations by the United States Department of Agriculture and Tidewater Research Station, Holland, Virginia, on the association of leader die-back and blight of sweet gum (*Liquidambar styraciflua*) [cf. 35, p. 55] with species of *Diplodia* [33, p. 511] wound inoculations with *D.* [*Botryodiplodia*] *theobromae* in the greenhouse produced die-back and cankers on young trees growing in a low-mineral sand and on young, vigorous, soil-grown trees of which the terminal, inoculated parts were enclosed in pliofilm bags. Placed under the latter conditions, trees already with induced cankers also developed die-back, but such sustained high temperature and humidity is unlikely to occur in nature. It is suggested that disturbance of the mineral balance may be a predisposing factor and that the fungus, a weak parasite, can cause cankers, some of which may be forerunners of leader die-back.

Chardenon (J.) & Taris (B.). **Effet phytotoxique de quelques fongicides vis-à-vis des boutures de Peupliers.** [Phytotoxic effect of some fungicides on Poplar cuttings.]—*C. R. Acad. Agric. Fr.*, 42, 14, pp. 709–713, 1956.

Having determined that DNC and dinitrobutyl phenol (DNBP) possess, at very low concentration, *in vitro* activity against *Dothichiza populea* [cf. 36, p. 143] and *Cytospora chrysosperma* [*Valsa sordida*: 35, p. 560], the authors examined the effect of these and of several other compounds at various concentrations on healthy and affected poplar cuttings, which were dipped for ten minutes, allowed to dry, and then set in semi-sterilized compost.

At a concentration of five per cent., DNC, DNBP, emulsified anthracene oils, and copper oxychloride permitted satisfactory bud and rootlet development, though there was necrosis at the base of the cuttings.

Moriondo (F.). **Alterazioni su piante di Pioppo in seguito a crisi di attecchimento.** [Damage to Poplars following the shock of transplanting.]—*Ann. Acad. Sci. for.*, 4, pp. 345–386, 30 figs., 1956. [French summary.]

A detailed account is presented of the author's study of a decline of young poplars in an experimental planting near Florence. An unidentified fungus belonging to the Sphaeropsidales (which is figured and described) was present in dead portions of the bark and in the wood, and it is thought that it became established owing to the weakness of the trees induced by transplanting. Further work is in progress.

Skaarup (B.). **Kastaniekræften (Endothia parasitica) og dens fremtrængen i Europa.** [Chestnut blight (*Endothia parasitica*) and its advance in Europe.]—*Dansk Skovforen. Tidsskr.*, 41, 4, pp. 196–208, 2 figs., 1 map, 1956.

C.M.I. distribution map No. 66 (1955) is reproduced in this useful survey of the available information on chestnut blight (*Endothia parasitica*), comprising an introductory note and sections on the occurrence of the disease in Europe; symptoms and development; spore stages of the fungus; lists of hosts; economic importance; and control.

Toole (E. R.) & Furnival (G. M.). **Progress of heart rot following fire in bottomland Red Oaks.**—*J. For.*, 55, 1, pp. 20–24, 1 fig., 2 graphs, 1957.

The spread of heart rot, caused by various fungi, in fire-scarred oaks (*Quercus nuttallii*, *Q. phellos*, *Q. nigra*, and *Q. falcata* var. *pagodaefolia*) in the delta areas of Mississippi and Louisiana was found to be influenced by scar age (four to 61 years in the trees examined) and size and by the height of the butt bulge and hollow. The extent of rot behind an old scar is about 2 ft. above the top of the

hollow and 3½ ft. above the butt bulge. The average rate of spread of established rot is 1¼ ft. per decade.

Gillespie (W. H.). **Recent extensive mortality of Scarlet Oak in West Virginia.**—*Plant Dis. Reptr*, 40, 12, pp. 1121–1123, 1 map, 1956.

An unexplained dying of scarlet oak (*Quercus coccinea*), first observed in 1953 and again in 1954 and 1956 in parts of western Virginia, is reported also from Pennsylvania, New Jersey, and New York. In some areas *Q. rubra*, *Q. velutina*, *Q. alba*, and *Q. prinus* are occasionally affected. There is a rapid browning and dying of the foliage from the top downwards, the leaves remaining attached for some time in contrast to the premature fall characteristic of oak wilt (*Endoconidiophora fagacearum*) [*Chalara quercina*].

Engelhard (A. W.). **Influence of time of year and type of inoculum on infection of Oak trees inoculated with the Oak wilt fungus.**—*Plant Dis. Reptr*, 40, 11, pp. 1010–1014, 3 figs., 1956.

In Pilot Knob State Park, Hancock county, Iowa, 14 of 49 oak trees inoculated with Petri dish cultures of *Endoconidiophora fagacearum* [*Chalara quercina*: 36, p. 288] between 25th April and 28th August, 1953, developed wilt, the incubation period generally ranging from three to nine weeks. All 41 trees inoculated between 1st February, 1953, and 9th January, 1954, with fragments of mats and pads remained healthy. Neither type of inoculum contained ascospores. In both series a slanting wound was made with a sterilized axe, the inoculum inserted underneath the bark and in the cut xylem, and the bark nailed down.

Of 21 trees receiving ascospore droplets from perithecia on diseased trees in May of both years, 16 developed symptoms, the incubation period in 14 of them being three weeks. Five to ten droplets were placed in a vertical knife wound 1 by ⅛ in., which was then covered with moist tissue paper.

Potlaichuk (V. I.). О специализации **Phomopsis quercella Died.** и **Cytospora intermedia Sacc.** [Concerning the specialization of *Phomopsis quercella* Died. and *Cytospora intermedia* Sacc.]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 6, pp. 200–201, 1954. [Received 1956.]

Studies in the U.S.S.R. showed that *Phomopsis quercella* from acorns [33, p. 57] can adapt itself to a variety of substrata, being parasitic on some and saprophytic on others, whereas *Cytospora* [*Valsa*] *intermedia*, also on acorns [loc. cit.], is highly specialized. Under the experimental conditions *P. quercella* was pathogenic to acorns, pear and ash seeds, and maple [*Acer*], oak, and ash seedlings.

Hepting (G. H.). **Forest disease research in the south.**—*J. For.*, 54, 10, pp. 656–660, 2 figs., 1956.

Much of this information on diseases of forest trees in the southern part of the United States has already been noticed in this *Review*. The white pine blister rust pathogen [*Cronartium ribicola*: 36, p. 147 and next abstract] is reported to be attacking *Ribes* spp. in Georgia. Stands of shortleaf and loblolly pine [*Pinus echinata* and *P. taeda*] affected by little leaf (associated with *Phytophthora cinnamomi* and poor soil conditions) [36, p. 220] should be cut early if heavy losses are to be avoided. Resistance appears to be heritable. *Fomes pini* [35, p. 854], the most important cause of heart rot in southern pines, is serious only in overmature stands. Among the common canker pathogens are *Nectria galligena* [35, p. 134] on black walnut, northern hardwoods, and yellow poplar [*Liriodendron tulipifera*] and *Strumella coryneoidea* on oak [33, p. 768]. An [unspecified] fungus wilt has been responsible for the death of numerous persimmon trees in central Tennessee in the past 20 years and has occurred in scattered areas throughout the

south. Of some 50 fungi causing heart rot in living oaks, *Polyporus hispidus* [34, p. 683] and *Poria spiculosa* [34, p. 686] are the most destructive. Oak leaf blister (*Taphrina caerulescens*) [35, p. 383], though not serious in the forest, is one of the worst diseases of shade trees. *Fusarium* wilt has entirely destroyed mimosa trees [*Albizzia* spp.: 28, p. 365] in many places; two resistant selections are now available.

Bergeson (E. D.) & Lorenz (R. W.). **Seasonal effectiveness of 2,4,5-T basal sprays for eradicating Ribes in White Pine blister rust control in Illinois.**—*J. For.*, 55, 1, pp. 17–19, 1957.

Since 1951, in Illinois, eradication of *Ribes missouriense*, the chief alternate host of the white pine [*Pinus strobus*] blister rust pathogen (*Cronartium ribicola*) [see preceding abstract], has been carried out successfully by basal sprays of 2,4,5-T in No. 1 fuel oil. This method is more economical (a third of the cost) and more efficient than hand-pulling or grubbing and can be applied throughout the year.

Capretti (C.). **Diplodia pinea (Desm.) Kickx agente del disseccamento di varie specie del gen. Pinus e di altre conifere.** [*Diplodia pinea* (Desm.) Kickx the cause of a die-back of different species of the genus *Pinus* and other conifers.] —*Ann. Accad. ital. Sci. for.*, 5, pp. 171–202, 5 pl., 7 graphs, 1956. [French summary.]

An account, based partly on the literature of the subject and partly on the author's studies at the Institute of Forest and Agricultural Pathology, University of Florence, is given of *Diplodia pinea* on conifers [cf. 35, pp. 57, 131, *et passim*]. The work deals with the morphology and taxonomy of the fungus, its systematy, synonyms (which are listed), cultural characters, parasitic activity, the factors predisposing trees to infection (with special reference to Italian conditions), inoculation experiments, saprophytic behaviour, hosts (which are listed), geographical distribution, and control. The bibliography comprises 77 titles.

Mielke (J. L.). **The rust fungus (Cronartium stalactiforme) in Lodgepole Pine.**—*J. For.*, 54, 8, pp. 518–521, 3 figs., 1956.

Cronartium stalactiforme is one of the more prevalent pathogens on lodgepole pine (*Pinus contorta*) [32, p. 111] in the intermountain and Rocky Mountain regions of the United States. The Indian paintbrush (*Castilleja* spp.) is probably its most common alternate host. On *P. contorta* it enters the trunk through small twigs and produces at first a very neat, elongated diamond-shaped lesion. Vertical growth follows the grain of the wood, trees with spiral grain having spiral trunk cankers. The disease affects trees of all ages, cankers being common high on the trunks of large and old trees. Owing to the slow lateral enlargement ($\frac{1}{4}$ to $\frac{1}{2}$ in. per year) of the cankers and the increasing girth of the tree, girdling is rare except when two or more cankers coalesce. Vertical growth is much more rapid, averaging 7 in. per year, and cankers can reach over 30 ft. in length. They are somewhat flattened or sunken, the wood usually becoming impregnated with resin.

Most of the branch and trunk cankers observed had infected bark removed from the margins by rodents, such as pine squirrels or chickarees (*Sciurus* spp.), which were believed until recently to be primarily responsible for the damage. In some areas of the Boise National Forest, Idaho, up to 30 per cent. of the trees were estimated to have trunk cankers. The only known method of control consists in the removal of diseased trees.

Jamalainen (E. A.). **Männyn karisteen torjunta kemiallisilla aineilla Leksvallin taimitarhassa.** [Pine needle cast control with chemicals at the Leksvall nursery.]—*Silva fenn.* 88, 2, 10 pp., 1956. [English summary.]

Needle cast (*Lophodermium pinastri*) [35, p. 731] of pines is reported to have

caused serious damage in the Leksvall nursery at Tammisaari and in other nurseries in southern Finland in 1954 and 1955. The best control (least browning and very few or no fruit bodies) at Leksvall in both years was secured by fortnightly applications, from 20th May to 27th September, of 2 per cent. Bordeaux mixture and of 0·2 per cent. dithane Z-78. Of the other fungicides tested 0·6 per cent. dithane D-14 alone was effective but not as much so as the other two.

Kennedy (R. W.). **Fungicidal toxicity of certain extraneous components of Douglas-Fir heartwood.**—*For. Prod. J.*, 6, 2, pp. 80–84, 1 fig., 1 diag., 2 graphs, 1956.

This is a tabulated survey and discussion of experiments at the Faculty of Forestry, University of British Columbia, Vancouver, to determine the effects on wood-destroying fungi of some chemicals present in Douglas fir (*Pseudotsuga menziesii*) [*P. taxifolia*] heartwood. In the malt agar culture procedure taxifolin [see next abstract] was more toxic to *Fomes annosus* and *Lentinus lepideus* than phlobatannin, neutral extractives, or free acids, though not nearly equal to zinc chloride. In tests carried out by the wood-block method, acetone- and ether-extracted samples sustained approximately equal weight loss—much higher than those of the controls—from infection by *L. lepideus*. The weight reduction of water-extracted blocks was slightly higher than in the control series.

It is concluded that lumber containing large quantities of taxifolin may be expected to last longer than unselected material under exposure to conditions favourable to decay.

Kennedy (R. W.) & Wilson (J. W.). **Variation in taxifolin content of a Douglas-Fir stem exhibiting target ring.**—*For. Prod. J.*, 6, 6, pp. 230–231, 2 figs., 1956.

A quantitative examination of taxifolin concentration across a 'target-ring' (consisting of three to ten alternating light- and dark-coloured, concentric, circular areas) in a specimen of *Pseudotsuga menziesii* [*P. taxifolia*: see preceding abstract] revealed a deficiency of this important extractive constituent in the pale zones [cf. below, p. 438], designated 'included sapwood', which present the macroscopic appearance of normal sapwood but are probably not physiologically active. It is considered likely that timber containing large amounts of 'included sapwood' would exhibit anomalous sulphite-pulping properties, while little resistance to the entrance of [unspecified] lignicolous fungi would be offered under conditions promoting infection.

Childs (T. W.) & Wright (E.). **Pruning and occurrence of heart rot in young Douglas Fir.**—*Res. Note Pacif. Northw. For. Exp. Sta.* 132, 5 pp., 1956. [Multilithed.]

Studies over 14 years in the Willamette, Siuslaw, and Gifford Pinchot National Forests and the Pack Forest of the University of Washington College of Forestry, Oregon, showed that heart rot of Douglas fir (*Pseudotsuga taxifolia*) caused by *Fomes pini* [35, p. 84], *F. subroseus* [19, p. 315], and *Stereum sanguinolentum* [cf. 14, p. 728] is not seriously increased by pruning and such infections as occur mostly die as the pruning wounds close. Lesions are commoner in spring-pruned than in fall-pruned trees, and where live branches have been cut.

Van Goor (C. P.). **Kaligebrek als oorzaak van gelepuntziekte van Groveden (Pinus sylvestris) en Corsicaanse Den (Pinus nigra var. corsicana).** [Potassium deficiency as the cause of yellow tip disease of Scots Pine (*Pinus sylvestris*) and Corsican Pine (*Pinus nigra* var. *corsicana*).]—*Ned. Boschb.-Tijdschr.*, 28, 2, pp. 21–31, 4 graphs, 1956. [English summary.]

Yellow tip disease of pines, attributable in most cases to potassium deficiency [cf. 33, p. 326], is reported to be prevalent in young plantations on poor heath

podsols in sandy areas in the Netherlands. The critical level of potassium in the current year's needles was estimated in tree-top samples collected during the autumn at 0·35 per cent. for Scots pine and 0·3 for Corsican. However, where other nutrients are deficient, e.g., on inland dunes, yellow tip may develop notwithstanding an abundance of potassium.

The critical level in the soil was found to range from about 0·006 to 0·012 per cent. potassium (as potassium oxide). The most effective control was secured in experimental plots by combined soil amendments of 100 kg. potassium sulphate and 25 kg. each of magnesium sulphate and basic slag.

Vaartaja (O.). **Notes on low temperature fungi.**—*Bi-m. Progr. Rep. Div. For. Biol., Dep. Agric. Can.*, 12, 4, p. 3, 1956.

In further studies of red patch disease in white spruce (*Picea glauca*) seed beds [35, p. 854] the constant isolation from newly diseased needles, and from the associated snow mould, of a *Pestalotia* related to or identical with *P. hartigii* suggested this fungus as a possible cause of the disease. At approaching 100 per cent. humidity and 0° to 10° C. the *Pestalotia*, together with *Phoma* sp. and other fungi, was obtained from the white mould that spread from diseased over healthy seedlings in the laboratory. At a lower humidity, however, less mould occurred on the diseased seedlings and none on the healthy; only *Penicillium* and *Gliocladium* were isolated. It was difficult, however, to simulate in the experiments the field conditions accompanying red patch development.

Søegaard (B.). **Leaf blight resistance in Thuja. Experiments on resistance to attack by Didymascella thujina (Dur.) Maire (Keithia thujina) on Thuja plicata Lamb.**—*K. VetHøjsk. Aarsskr., 1956*, pp. 30–48, 11 figs., 3 diags., 1956.

Studies at the Hørsholm Arboretum of the Royal Veterinary and Agricultural College, Denmark, showed that resistance of *Thuja* spp. to *Didymascella thujina* [15, p. 412; 32, p. 350; map 149] is determined by a genetically inherited character, which appears homozygously recessive in *T. plicata* and dominant in *T. standishii*. In crosses between the two species the F_1 shows 100 per cent. resistance, and in back crosses to *T. plicata* resistant and susceptible progeny segregate equally.

Physiological resistance is also available, cuttings from older trees (best obtained from July to August) being more resistant than seedlings.

MacLean (H.) & Gardner (J. A. F.). **Distribution of fungicidal extractives (thujaplicin and water-soluble phenols) in Western Red Cedar heartwood.**—*For. Prod. J.*, 6, 12, pp. 510–516, 1 fig., 1 diag., 3 graphs, 1956.

At the Vancouver Laboratory, Forest Products Laboratories of Canada, analyses for thujaplicin and water-soluble phenols in the heartwood of *Thuja plicata* [34, p. 9; 36, p. 291] established a general pattern of increasing content with lengthening radial distance from the pith and decreasing content with increasing distance up the tree. Where typical colour variations occurred within a sample, a change from a paler to a darker shade coincided with a reduction in the content of these natural preservatives against [unspecified] wood-destroying fungi [cf. above, p. 437]. There were wide variations in the amounts of the constituents, hot water solubilities ranging from 1·2 to 23·3 and thujaplicin contents from 0 to 1·2 per cent.

Sato (K.), Ota (N.), & Shoji (T.). **Influence of MH-30 treatment upon the control of overgrowth in 'Sugi' seedlings. Especially on the effects of the frost damage and gray mold control.**—*J. Jap. For. Soc.*, 37, 12, pp. 533–537, 1955. [Japanese, with English summary. Abs. in *Biol. Abstr.*, 31, 1, p. 266, 1957.]

Cryptomeria japonica seedlings, treated with 0·3 and 0·12 per cent. solutions of MH-30 [58 per cent. diethanolamine salt of maleic hydrazide; U.S. Rubber Co.,

Naugatuck] at the Forest Experiment Station, Akita, Japan, to control root elongation, showed resistance to *Botrytis cinerea* [31, p. 582] and *Sclerotinia kitajimana* [loc. cit.] artificially inoculated, the former also under snow in the nursery. MH-30 checked the mycelial growth of the two fungi and of *Rhizoctonia* [*Corticium*] *solani* [cf. 34, p. 412], and conidial germination of *B. cinerea*.

Timber preservation technical notes for wood preservers. Commercial timbers which are commonly impregnated.—*Timb. Tech.*, 65, 2211, p. 39, 1 fig., 1957.

As in the case of other timbers, the preservability of European whitewood (spruce, *Picea abies*), appears to depend to some extent on its provenance, material from the northern countries of Sweden, Norway, Finland, and Russia being generally more difficult to treat than that originating in the southern areas of cultivation, e.g., Yugoslavia, Austria, and Czechoslovakia. The wood makes shapely poles but it is not durable and tends to develop a heart rot [of unspecified origin] at overmaturity, taking the form of a brown streak in the early stages and causing softening and sponginess when severe.

In France, where spruce is largely used for telegraph and transmission poles, a process of rapid seasoning, known as the Estrade oven, is applied. Under the influence of hot air currents the poles exude their moisture and produce the deep cracks which would otherwise develop during seasoning. Sterilization after a preliminary period of seasoning to arrest incipient decay is effected by means of several hours' immersion in a creosote oil bath at a temperature of 180° F. A good average life may be ensured by the conventional full-cell treatment with creosote or a water-soluble preservative at a high concentration, which should penetrate to a depth of $\frac{1}{4}$ in.

Canadian spruce (*P. glauca*) is very similar in texture to the northern European and equally resistant to deep penetration of preservatives.

Bellmann (H.). **Praktische Erfahrungen und wissenschaftliche Erkenntnisse der Teerölimprägnierung von Leitungsmasten.** [Practical experience and scientific knowledge concerning the tar oil impregnation of transmission poles.]—*SchrReihe öst. Ges. Holzforsch., 1956*, 6, 43 pp., 1 fig., 7 graphs, 1956.

This general paper comprises a review of the literature on tar oil impregnation of telegraph and electricity poles, with some reference also to railway sleepers. It covers the composition and toxicity of the oil; the effectiveness of the whole oil and of fractions of it; the impregnation of pine and spruce timber; the surface qualities and electrical conductivity (of the impregnated wood); chemical changes in the soil with ageing; and the economic value of the process. There is a bibliography of 117 references.

Ellwood (E. L.). **Preservative treatment for Australian rail sleepers.**—*Commonw. Engnr*, 44, 1, pp. 6–10, 2 figs., 1956.

This is an informative survey and discussion of the current position in Australia with regard to the preservation of timber for railway sleepers. During the last decade the supply of naturally durable species has been declining rapidly and the average service life of the sleepers now being installed is estimated at 19 years as compared with 25 for those of more resistant wood. Recent inspections in Victoria revealed up to 70 to 80 per cent. moderate to severe [unspecified] decay after 10 years' service. However, with the development of an improved treating method, involving the application of pressure at 1,000 instead of 200 lb. per sq. in., the preservation of *Eucalyptus* spp. with creosote, creosote and oil, pentachlorophenol [36, p. 224], naphthenic acid, and other disinfectants has become both practicable and economical.

Zubieta (G. J.). **Mezclas preservadoras de madera solubles en agua. I. Introducción a su tecnología.** [Water-soluble wood-preservative mixtures. I. Introduction to their technology.]—*Indust. y quím.*, 17, 9, pp. 549–551, 565, 1956.

This is a useful survey of available information on up-to-date methods of timber preservation with water-soluble chemicals. Most of the preparations listed, with explanatory comments and references to the literature, are well known, but mention may be made of chemonite, a proprietary mixture of copper arsenate and copper hydroxide in a strong solution of ammonia, the last-named preventing corrosion of the equipment. It is effective at a minimum concentration of 6 kg. per cu. m.

Varela Cortés (L.). **Use of the aromatic hydrocarbons of petroleum (160–185°) for making copper fungicides.**—*An. Fac. Cienc. fis. Concepción*, 4, pp. 131–138, 1955. [Spanish. Abs. in *Chem. Abstr.*, 51, 2, col. 1517, 1957.]

In studies at the University, Concepción, Chile, the toxicities to standard cultures of wood-destroying fungi, e.g., *Coniophora cerebella* and *Poria vaillantii*, of copper salts of aromatic acids [see next abstract] prepared by chloromethylation and cyaniding of a 160° to 185° C. petroleum fraction were found to be higher than that of copper naphthenate of equal copper content (2·9 to 6·7 per cent.).

Orio (E.). **Use of the heavy aromatic hydrocarbons (250–275°) for making copper fungicides.**—*An. Fac. cienc. fis. Concepción*, 4, pp. 112–123, 1955. [Spanish. Abs. in *Chem. Abstr.*, 51, 2, col. 1517, 1957.]

The minimum levels of toxicity [to wood-destroying fungi] of copper salts prepared from acids made from the aromatic fractions of Chilean petroleum (boiling at 250° to 275° C.) were at a copper content of 0·1 per cent., lower than that of copper naphthenate [cf. preceding abstract].

Mizumoto (S.). **Studies on Lenzites abietina Fr., and some of its allied species. VI. Effect of sodium pentachlorophenate upon L. abietina, L. subferruginea Berk., L. trabea (Pers.) Fr., and L. saepiaria (Wulf.) Fr.**—*J. Jap. For. Soc.*, 38, 3, pp. 111–113, 1956. [Japanese, with English summary. Abs. in *Biol. Abstr.*, 31, 1, p. 266, 1957.]

Tests at Shinshu University, Japan, showed that the lowest concentrations of sodium pentachlorophenolate required to check the growth in agar of *Lenzites abietina, L. subferruginea, L. trabea*, and *L. saepiaria* were, respectively, 0·0006, 0·0007, 0·0008, and 0·0007 per cent., as against 0·002 per cent. for *Polystictus sanguineus*. Wood blocks dipped in a 5 per cent. aqueous solution of the chemical did not decay, but solutions of under 1 per cent. were ineffective.

Yokota (S.). **Comparative activities degrading cellulosic substances by wood-rotting fungi.**—*Bull. Tokyo Univ. For.*, 50, pp. 37–44, 1 graph, 1955. [Japanese summary. Received March, 1957.]

In a study at the Institute of Forest Botany, University of Tokyo, of the cellulolytic activities of ten species of fungi producing white rots of wood and of nine producing brown rots, pieces of filter-paper 2 by 10 cm. in 25 ml. of nutrient solution were inoculated with the test organisms and kept at 27° C. in darkness for three weeks. All the white-rotting fungi and *Tyromyces* [*Polyporus*] *balsameus* grew vigorously.

Only *Lenzites betulina*, *Lampteromyces japonica* [*Pleurotus japonicus*], and *Polyporus balsameus* caused considerable difference in the pH of the nutrient solution. Decomposition of cellulose (loss in weight of the paper strips) reached 16·6 per cent. (the highest figure) with *Trametes sanguinea*, and even with *Daedaleopsis* [*T.*]

rubescens, the weakest destroyer of cellulose among the white-rotting fungi, it was 4·5 per cent. Of the fungi causing brown rots, *P. balsameus* caused 15·6 per cent. loss of weight, but the others were feeble, *Poria vaporaria* and *Trametes albida*, the strongest, giving only 1·6 per cent. loss. C_x [enzyme] activity on soluble cellulose did not coincide with weight loss in filter paper; in the white-rotting fungi it was less than in the brown.

When the loss of weight by the paper approached 10 per cent., the cellulose of the inoculated areas was almost destroyed, and was completely so at 11 per cent. or more. Fungi inducing such destruction were *Trametes sanguinea*, *Pleurotus japonicus*, *Coriolus* [*Polystictus*] *versicolor*, *Lenzites betulina*, *Cryptoderma* [*Fomes*] *pini*, and *Fomitopsis* [*Fomes*] *anebus*. The greatest C_x activity, on the other hand, among the brown-rotting fungi, was 1·15 units (one unit of activity hydrolyses 0·4 mg. glucose per ml. per hour) produced by *Gloeophyllum trabeum* [*Lenzites trabea*], while that of *G. saepiarium* [*L. saepiaria*], *Poria vaporaria*, and *G. subferrugineum* [*L. subferruginea*] was about 0·5 to 0·6. Though *L. trabea* exerted the greatest C_x activity, it caused only 1·2 per cent. weight loss. It is concluded that the degradation of the paper strips was caused by the cellulolytic enzymes C_1 and C_x secreted by the fungi.

Jurášek (L.) & Rypáček (V.). **Vznik a funkce tmavých zon ve dřevě.** [The origin and function of dark zones in wood.]—*Sborn. přír. Společ. Mor. Ostravé*, 15, 2–3, pp. 320–332, 2 pl., 3 diags., 1954. [Russian and English summaries.]

Field observations on rotting beech stumps and the laboratory examination of spruce wood decayed by pure cultures of *Armillaria mellea*, *Lentinus tigrinus*, *Phellinus* [*Fomes*] *igniarius*, *P.* [*F.*] *robustus* f. *hartigi*, and *Stereum hirsutum* showed that the cell lumina in the dark zones produced by these fungi contain brown structures corresponding to pseudosclerotia. At the borders of the dark areas the mycelium is normal and under suitable culture conditions the pseudosclerotia produce fungal hyphae and sometimes fruiting bodies of *Hypholoma fasciculare*. The hyphal walls of the pseudosclerotia are greatly thickened, rendering the dark zones resistant to chemicals and humification.

Determinations of the humidity in beech stumps revealed that the dark zone divides parts differing distinctly in humidity content, which is much higher towards the centre; the zone thus encloses wood with the optimum humidity for fungus growth. Growing a pure culture of *Stereum hirsutum* in spruce wood sawdust resulted in a similar dark area, which retained in a particular layer the optimum humidity for the fungus. Both field and laboratory observations showed that the optimum humidity was towards the centre of the wood, but as the pseudosclerotia do not cover the inner wood so completely as to prevent loss of water, new dark zones are repeatedly formed deeper and deeper in the wood.

The fungi themselves regulate the maintenance of moisture in the wood and also optimum physical conditions to suit their own growth and development. This process is closely related to the regulation of temperature conditions of wood which is being decomposed by wood-rotting fungi [cf. 36, p. 223].

Shanta (Miss P.). **Isolation of Cercospora personata, its sporulation and growth in pure culture.**—*Proc. Indian Acad. Sci.*, Sect. B, 44, 5, pp. 271–275, 1956.

The author reports from the University Botany Laboratory, Madras, that *Cercospora personata* [*Mycosphaerella berkeleyii*: cf. 34, pp. 517, 697] may be easily cultured in a sporulating condition on Czapek's medium with yeast extract, provided that inoculation is carried out with fresh spores from leaf spots.

The isolate studied was at first dependent on thiamine and inositol in the medium, but on repeated sub-culturing became autotrophic with respect to inositol, while increasingly dependent on thiamine [cf. 34, p. 721].

Domsch (K. H.). **Die Raps- und Kohlschotenschwärze.** [The blackening of Rape and Cabbage siliquae.]—*Z. PflKrankh.*, 64, 2, pp. 65–79, 4 figs., 1957. [English summary.]

Important information on the etiology, symptoms, epidemiology, diagnosis, prevention, and control of blackening of rape and cabbage siliquae by *Alternaria* spp., especially *A. brassicicola*, is presented from the Kiel-Kitzeberg (Schleswig-Holstein) branch of the German Biological Institute [32, p. 292]. Most of the papers listed in the bibliography of 28 titles have already been noticed in this *Review*.

The Ulster test [20, p. 261], one of several methods used for estimating infection on cabbage seeds, forecast accurate percentages of infection, which were, however, relatively higher than those obtained from the sowing of random samples in soil, also regarded as a fairly exact procedure. Actual counts on seven varieties disclosed between 0 and 2,100 spores per seed. Timely and repeated fungicide treatments are essential for the control of *A. brassicicola*. On the basis of numerous experiments 0·2 per cent. ziram is recommended for application before blossom-fall, followed by preparations based on 1 per cent. rhodanedinitrobenzol or 0·2 per cent. thiram in the later stages of growth.

Hull (R.). **Sugar Beet yellows in Great Britain, 1955.**—*Plant Path.*, 5, 4, p. 130, 1956.

In 1955 counts of sugar beets affected by yellows virus [35, p. 802], made by the agricultural staff of the British Sugar Corporation in 149 sample fields in Great Britain, gave 0·02, 1·5, 6·4, and 16 per cent. infected plants at the end of June, July, August, and September, respectively. At the end of August 44·7 per cent. of the whole crop of 405,000 acres had under 1 per cent. yellowed plants, 47·5 per cent. had between 1 and 20 per cent., 6·5 per cent. had 21 to 60 per cent., and 1·3 per cent. had over 60 per cent. The actual yield of roots amounted to 11·64 tons per acre, instead of an estimated 12 tons.

The hot, dry summer favoured the development of *Aphis fabae*, but *Myzus persicae* developed late. Plots of sugar beet seed plants taken from all steckling beds used for commercial crops averaged 2·4 per cent. yellowed plants; the beds used for planting the 1956 seed crop averaged 0·21 per cent. Mangold steckling beds had up to 8·7 per cent. Stecklings germinating in early August developed yellows in spite of regular spraying with insecticides [35, p. 870]. Much yellowing was also due to boron deficiency, symptoms of which were noted in 16,000 acres.

Lüdecke (H.) & Neeb (O.). **Über die Gelbvirusempfindlichkeit der Zuckerrübe in der ersten Phase der Entwicklung.** [On the susceptibility to yellows virus of the Sugar Beet in the first stage of development.]—*Zucker*, 10, 3, pp. 55–56, 1 graph, 1957.

Continuing their studies at the Institute for Sugar Beet Research, Göttingen, Germany, on the influence of the infection date on the reaction of sugar beet to yellows virus [35, p. 257], the authors inoculated Kleinwanzlebener E seedlings, sown on 1st and 19th April and 2nd, 11th, and 24th May, 1955, using *Myzodes* [*Myzus*] *persicae* as the vector. The yield reductions did not increase uniformly, being represented graphically by a flattened curve, so that the lethal limit was not attained even in the case of the first inoculation. As already shown, however, susceptibility declined markedly with increasing maturity, falling to a minimum at harvesting 155 days after sowing. Hence the complete curve of susceptibility during the vegetative period assumes an 'S' shape.

Mundry (K.-W.) & Schneider (F.). **Zentrifugation fadenförmiger Partikel in einem Dichtegradienten : Die Abtrennung des Vergilbungsvirus der Rüben aus Blatthomogenisaten.** [Centrifugation of filiform particles in a density gradient:

the separation of the Beet virus yellows from leaf homogenates.]—*Z. Naturf.*, **11b**, 9–10, pp. 573–578, 1 diag., 1956. [English summary.]

At the Institute for Agricultural Technology and Sugar Industry, Technical College, Brunswick, Germany, density gradient centrifugation in sucrose solutions proved to be an effective method for the separation of sugar beet yellows virus [36, p. 227] from the normal constituents of leaf homogenates of *Tetragonia expansa* and *Chenopodium foliarum*. The virus was shown by tests on *Nicotiana quadrivalvis* to have lost virtually nothing of its serological activity as a result of the treatment. It was further demonstrated by inoculation experiments on eight- to ten-week-old Kleinwanzlebener E sugar beet plants that virulence was practically unimpaired.

Schlösser (L. A.). **Cercopoly — ein Fortschritt in der Cercospora-Resistenzzüchtung.** [Cercopoly—an advance in *Cercospora* resistance breeding.]—*Zucker*, 10, 2, pp. 35–38, 1957.

This is a fully tabulated survey of experiments performed during 1954–5 in Germany, Italy, Switzerland, Austria, and Turkey, which clearly demonstrated the superiority in resistance to beet leaf spot (*Cercospora beticola*) of the polyploid 'Cercopoly' selections [35, p. 805], not only over the susceptible Kleinwanzlebener N but also over the diploid CR (*Cercospora*-resistant).

Koch (F.), Göttemann (E.), & Vetter (A.). **Vierjährige Sorten-Spritzversuche mit Zuckerrüben im niederbayerischen Cercospora-Befallsgebiet.** [Four years variety-spraying experiments with Sugar Beets in the Lower Bavarian *Cercospora* epiphytotic area.]—*Zucker*, 10, 6, pp. 121–129, 1957.

This is a fully detailed, tabulated survey of experiments carried out from 1952 to 1955, inclusive, at Deggendorf, Bavaria, to determine the efficiency of spraying six sugar-beet varieties with cupravit (ob 21), containing 50 per cent. copper oxychloride, for the control of leaf spot (*Cercospora beticola*). The results have already been briefly noted [35, p. 805]. The yields of the highly resistant Kleinwanzlebener CR and Buszczynski CLR were raised (in percentages) by 1 and 2, respectively; of the semi-resistant Beta 242/53 by 5; of the moderately susceptible polybeta by 9; and of the highly susceptible Kleinwanzlebener E and N by 11 and 10, respectively.

Marić (A.). **Prilog rešavanju problema Cercospora beticola na Šećernoj Repi.** [A contribution to the solution of the problem of *Cercospora beticola* on Sugar Beet.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1956*, 36, pp. 17–28, 3 graphs, 1956. [English summary.]

In fungicide evaluation trials in 1955 at the Institute of Agricultural Researches, Novi Sad, Yugoslavia, for the control of *Cercospora beticola* on sugar-beet [36, p. 227] all the chemicals used increased the yields of roots and sugar and, except for systox, of leaves as well. Three applications of 2 per cent. Bordeaux mixture on 31st July and 8th and 31st August, during a period of heavy rain, gave the most effective protection and increased sugar content by 63 per cent. Dithane-zineb was less effective under these conditions.

Schuster (M. L.) & Christiansen (D. W.). **An orange-coloured strain of Corynebacterium flaccumfaciens causing Bean wilt.**—*Phytopathology*, 47, 1, pp. 51–53, 1957.

In Nebraska samples of beans (*Phaseolus vulgaris*) were found to contain in the three years, 1953–5, 0·8, 0·47, and 0·55 per cent., respectively, of orange-coloured seed, representing 8, 16, and 35 per cent. of the totals of diseased seed. Investigation at the University of Nebraska, Lincoln, showed this orange colouring to be

caused by a new variety of the bean wilt organism *Corynebacterium flaccumfaciens* [cf. 5, p. 463; 35, p. 503], which was named *aurantiacum*. Seed infection was reproduced by inoculation of nodes bearing pedicels with developing pods. Hypodermic injection of the lower stem produced wilt and some seed infection. Inoculation of unsterilized soil produced visible infection in 18 out of 108 seeds from 12 plants. Germination of orange-coloured seed in potted soil was 3 per cent. Orange bacteria were successfully recovered from soy-bean, scarlet runner bean (*P. coccineus*), and tepary bean (*P. acutifolius*) five weeks after inoculation, though only the runners wilted.

Sörgel (G.). **Vergleichende Untersuchungen über die Konidienkeimung von Mycosphaerella pinodes (Berk. et Blox.) Stone, Ascochyta pisi Lib. und Ascochyta pinodella Jones in Abhängigkeit von der Temperatur.** [Comparative studies on the conidial germination of *Mycosphaerella pinodes* (Berk. & Blox.) Stone, *Ascochyta pisi* Lib., and *Ascochyta pinodella* Jones in relation to temperature.] —*Phytopath. Z.*, 28, 2, pp. 187–204, 4 figs., 10 graphs, 1956.

In further studies on three important pathogens of peas in the current series at the Institute for Plant Breeding, Quedlinburg, Germany [35, p. 214], the optimum temperature for conidial germination of *Mycosphaerella pinodes* and *Ascochyta pisi* was found to be approximately 24° C. and for *A. pinodella* 22°. The germ-tubes, several of which may be formed by each individual conidial cell, arise at either end of a conidium, whether uni- or bicellular. Temperatures above the optimum act more rapidly than suboptimal ones in the delay of conidial germination. From 14° downwards and 30° upwards anomalies in germ-tube development become apparent; in the case of tri- and quadricellular conidia they are induced by slighter deviations from the optimum temperature.

Nutrient uptake and germ-tube development are linked in characteristic fashion. The first germ-tubes of unicellular conidia appear as soon as the rate of expansion reaches a low level, and those of bicellular individuals even earlier. At temperatures of 30° and upwards germ-tubes are formed only after a renewal of nutrient uptake.

At suboptimal temperatures the action of the fungistatic substance (phytoncide) in the testa of the grey variegated sugar pea variety [32, p. 229] is intensified.

Armstrong (G. M.) & Armstrong (J[oanne] K.). **Celery yellows Fusarium causes wilt of Peas.**—Abs. in *Phytopathology*, 47, 1, p. 2, 1957.

Cross inoculation [at South Carolina Agricultural Experiment Station] of peas and celery with *Fusarium apii* and *F. oxysporum* f. *pisi* races 1 and 2 [35, pp. 512, 649] showed the last two to be pathogenic only to peas, but the first-named infected both. Peas showed a degree of resistance to *F. apii*, which lost pathogenicity in this host (successive isolates causing wilting of 100, 80, and 50 per cent. of the Thomas Laxton variety in tests over a year), while maintaining it in celery.

Yen (D. E.) & Cruickshank (I. A. M.). **Wilt-resistant Greenfeast Peas.**—*N.Z.J. Agric.*, 94, 2, p. 149, 1957.

Selections of Greenfeast peas have retained their resistance to wilt (*Fusarium orthoceras* var. *pisi*) [33, p. 140] in repeated trials in New Zealand and England, and some seed was sown commercially in Canterbury, New Zealand, in 1956–7. It is hoped that the release of this line, if kept free from the susceptible Greenfeast from which it is indistinguishable, will enable the interval of 11 to 15 years at present recommended between pea crops after severe wilt infection to be reduced to five years. The latter precaution is necessary against other pea diseases such as collar rot (*Ascochyta* spp.) [35, p. 81].

Erwin (D. C.). **Fusarium and Verticillium wilt diseases of Cicer arietinum.**—Abs. in *Phytopathology*, 47, 1, p. 10, 1957.

A wilt disease of *Cicer arietinum* in California, characterized by leaf yellowing and xylem necrosis, is attributed to a *Fusarium* sp. [cf. 34, p. 349]. Certain selections were resistant, while cowpea and lucerne were not attacked. *Verticillium albo-atrum* was also isolated from *C. arietinum* and induced a wilt in it.

Abdullaev (S. G.). Пероноспора Лука в Азербайджане и меры борьбы с нею. [*Peronospora* of Onion in Azerbaijan and control measures against it.]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 49–57, 1951. [Received 1956.]

In Azerbaijan, U.S.S.R., *Peronospora schleidenii* [*P. destructor*: 12, p. 610] affected over 81 per cent. of onion plants in some fields in 1946–9, infected plants yielding 46·7 to 94·7 per cent. less seed than the healthy ones. Experiments showed that in order to control the disease all plant debris should be burnt after harvest and the bulbs planted out as late as possible (March). Spacing should be wide, and bulb treatment at 40° [C.] for eight or at 45° for four hours at least 12 to 18 months before planting is recommended. Control with chemical sprays is of secondary value.

Freeman (T. E.). **Studies on the control of pink root of Shallot.**—*Diss. Abstr.*, 16, 9, p. 1567, 1956.

Summarizing his work at Louisiana State University the author states that chemicals reported to have reduced pink root disease of shallot [*Pyrenochaeta terrestris*: cf. 35, p. 66] in Colorado were not effective in Louisiana. Of 44 fungicides subjected to preliminary tests in the laboratory seven, of which six were organic mercurials, were fungicidal at concentrations practicable in the field. In greenhouse tests mergamma and mersolite 7 were phytotoxic. In field tests all except mergamma significantly reduced the incidence of pink root when applied to the open row as a drench, providing a concentration of 100 p.p.m. in the soil; semesan, setrete, and agrox gave very good control of the disease in that order. In practical terms such treatment would require about 11 lb. per acre with 6 ft. rows and 17 lb. on 4 ft. rows.

A four-year rotation plan was found unsuitable for control, and heat treatment (56° C. for six minutes) of infected setts was both ineffective and injurious.

Roberts (E. T.). **Control of Stemphylium radicinum on Carrot seeds.**—*Plant Path.*, 5, 4, p. 122, 1956.

At the National Agriculture Advisory Service, Reading, it was found that hot water treatment of carrot seed at 122° F. for 25 mins. gave good control of *Stemphylium radicinum*, and though reducing germination by nearly 50 per cent. in the laboratory was less deleterious in the field [cf. 32, p. 533].

Thind (K. S.) & Randhawa (H. S.). **Studies on the nutrition of Colletotrichum capsici (Syd.) Butler & Bisby, the incitant of dieback of Chillies.**—*Curr. Sci.*, 26, 1, pp. 17–18, 1957.

At the Department of Botany, Punjab University, Amritsar, India, 52 carbon and 35 nitrogen sources were tested on the growth and sporulation of *Colletotrichum capsici*, the cause of die-back of chilli [35, p. 453]. With potassium nitrate as the nitrogen source, growth was best on dextrose, sucrose, and maltose, and sporulation on pectin, maltose, starch, and tartaric acid. Organic nitrogen compounds were generally better for sporulation than inorganic.

Treggi (G.). **Attacchi di Sclerotium rolfsii Sacc. su colture di Pomodoro e di Peperone.** [Attacks of *Sclerotium rolfsii* Sacc. on crops of Tomato and Chilli.]—

Ann. Sper. agr., N.S., 10, 5, pp. 1553–1574, 1 pl., 2 figs., 6 graphs, 1956. [English summary.]

In a study at the Institute of Plant Pathology and Agricultural Microbiology, University of Pisa, of the physiological characters of strains of *Sclerotium rolfsii* isolated from crops of tomatoes [cf. 35, p. 381] and chillies [cf. 34, p. 580] growing near Lucca and severely affected by foot-rot, the fungus grew most vigorously at temperatures between 30° and 33° C. In identical conditions of acidity, organic content, temperature, and humidity, it grew better in a sandy or somewhat loose soil than in clay, growth being favoured by 50 per cent. humidity, the presence of 20 per cent. manure, or 5 per cent. soluble starch. The vitamins B_{12}, inositol, and niacin favoured sclerotial formation. When the sclerotia were immersed for 24 hours in suspensions of different fungicides, 0·25 per cent. abavit N, 0·125 tuzet, and 0·25 per cent. sulphur carbamate reduced germination, respectively, to 1 to 2, 5, and 1 per cent.

Salerno (M.). **Mal bianco del Pomodoro, del Peperone, e della Melanzana.** [Powdery mildew of Tomato, Chilli, and Eggplant.]—*Tec. agric.* (*1956*), 3–4, pp. 141–144, 2 figs., 1956.

A brief account is given in semi-popular terms of the causal organism, symptoms, and control of powdery mildew (*Leveillula taurica*) of tomato, chilli, and eggplant in Italy [35, p. 658].

Garofalo (F.). **Sull' avvizzimento delle piante di Solanum melongena L. in Piemonte.** [On the wilt of *Solanum melongena* L. plants in Piedmont.]—*Ann. Sper. agr.*, N.S., 10, 4, pp. 1383–1400, 4 pl., 6 figs., 1956. [English summary.]

This account of the author's study of a wilt of eggplants in different parts of Piedmont, Italy, caused by *Fusarium oxysporum* (believed to be the agent mainly responsible), *F. moniliforme* [*Gibberella fujikuroi*], and *F. scirpi* var. *caudatum*, is an expanded version of one already noticed from another source [36, p. 372]. Investigations on the biological and physiological characters of the three fungi and the preventive control of the condition are in progress.

Semal (J.). **Transmission par pucerons de Cucumis Virus 1 var. Chr. Noordam de Céleri à Céleri.** [Transmission by aphids of *Cucumis* virus 1 var. Chr. Noordam from Celery to Celery.]—*Parasitica*, 12, 3, pp 71–73, 1956. [English summary.]

In further studies at the Laboratory of Phytovirology, Gembloux, Belgium, the chrysanthemum strain of cucumber mosaic virus [36, p. 162] was transmitted from infected to previously healthy Plein Blanc Doré celery plants by *Myzus persicae*, but not by *M. ascalonicus* or *Aphis gossypii*.

Aycock (R.) & Winstead (N. N.). **Viruses plague Lettuce.**—*Res. & Fmg., N.C.*, 14, 1 and 2, p. 7, 2 figs., 1955.

The authors report on the importance of the virus diseases of lettuce, big vein [34, p. 568] and mosaic [cf. 35, p. 67], in the lettuce-growing areas of south-eastern North Carolina. Big vein usually causes no serious loss, though in seasons when the temperature is low for long periods head size may be reduced and maturity delayed. Observations in 1955 revealed that mosaic, until recently considered as of little importance, contributed significantly to the low yields and poor quality of the spring crop. Seed from mosaic-free lettuce is now commercially available [36, p. 371] and its use in trials at Castle Hayne resulted in 8·4 per cent. mosaic as opposed to 40 per cent. with regular seed, and a yield of 14,448 lb. per acre as compared to 12,432 lb.

Frosheiser (F. I.). **Studies on the etiology and epidemiology of Diaporthe phaseolorum var. caulivora, the cause of stem canker of Soybeans.**—*Phytopathology*, 47, 2, pp. 87–94, 3 figs., 1957.

This is a full account of work in Minnesota already noticed from an abstract [35, p. 412; cf. 36, p. 372, and following abstracts].

Dunleavy (J. M.). **Susceptibility of Soybean petioles to attack by Diaporthe phaseolorum var. caulivora.**—*Proc. Iowa Acad. Sci.*, 62, pp. 104–108, 1 fig., 1955. [Received March, 1957.]

In 1953 and 1954 at the Department of Botany and Plant Pathology, Iowa State College, Ames, Mandarin (early maturing), Hawkeye (intermediate), and Chief (late) soy-bean varieties were inoculated with *Diaporthe phaseolorum* var. *caulivora* [36, p. 229 and preceding and next abstracts] by the toothpick method. The peak period for susceptibility to infection through petioles was about mid-July. Under Iowa conditions Mandarin is not known to be naturally infected, but infection of Hawkeye and Chief is common, the latter remaining susceptible longer than the former and much longer than Mandarin. For the earliest inoculation (at 61 days) plants from the second (end of May or early June) and third (mid- or 3rd week of June) sowings were not as susceptible as those from the first (beginning of May). Plants from early sowings appear to be most susceptible in the petioles at about 75 days after planting, but since most of the naturally infected plants are found much later (100 to 120 days for Hawkeye) it is presumed that infected petioles are unlikely to be an important source of stem canker.

Dunleavy (J. M.). **A method for determining stem canker resistance in Soybean.**—*Proc. Iowa Acad. Sci.*, 63, pp. 274–279, 1 fig., 1 graph, 1956.

At the Iowa Agricultural Experiment Station, Ames, 12 soy-bean varieties were inoculated at the time of commencement of pod formation in the uppermost node, using cultures of *Diaporthe phaseolorum* var. *caulivora* [36, p. 372, and preceding abstract] grown on tooth-pick tips [33, p. 402] and inserted in petiole stubs (in field-grown plants) 1 in. from the pulvinus or in cut stems 1 in. above the third node from the top (in greenhouse plants). The cut surfaces were smeared with petrolium jelly to prevent desiccation. In varieties in which the infected petioles were shed a lower percentage of stem infection resulted than in those in which they were retained. Although the estimation of stem canker resistance by this method was fairly satisfactory there were some drawbacks, including wind damage to inoculated petioles, necessitating the adoption of a method for measuring resistance qualitatively.

In a test using ten plants each of the resistant Harosoy and line A6K-1040 and the susceptible Hawkeye inoculated at the stem tips with *D.p.* var. *caulivora* growth was most rapid in Hawkeye and less in A6K-1040, being intermediate in Harosoy. When the pod and stem blight fungus, *D.p.* var. *sojae*, was substituted in a similar test the rates of growth in A6K-1040 and Hawkeye, and in Harosoy after 21 days, were similar although greater initially in the last named. *D.p.* var. *sojae* continued to grow more rapidly in Harosoy, passing the first node in 60 per cent. of the test plants. Growth of *D.p.* var. *caulivora* was retarded at the nodes, but resumed its former rate once these were penetrated. Thus varieties with more nodes per unit of stem permitted a slower rate of growth of the pathogen than those with fewer nodes, and this should be taken into account in comparing fungus growth rates in varieties with widely different internode lengths.

Using this method it was shown that the stem canker resistance of soy-beans was directly proportional to the rate of growth of the pathogen in inoculated stems.

It is concluded that the advantages of the technique outweigh the disadvantages and that it is an improvement on previous methods for determining stem canker resistance.

Bergman (B. H. H.). **Het mosaiek I en de heksenbezemziekte van de Aardnoot (Arachis Hypogaea L.) in West-Java en hun vector, de jasside Orosius argentatus (Evans).** [Mosaic I and witches' broom disease of the Groundnut (*Arachis hypogaea* L.) in West Java and their vector, the jassid *Orosius argentatus* (Evans).]—*Tijdschr. PlZiekt.*, 62, 6, pp. 291–304, 2 pl., 1 graph, 1956. [English summary.]

In earlier work in Indonesia (*Landbouw, Buitenz.*, 19, pp. 337–347, 1946–1947) Thung distinguished between three mosaic diseases of the groundnut [cf. 34, p. 340], for which he claimed some evidence of aphid transmission, and also witches' broom, which he was unable to transmit by insects. The present author gives a detailed description of the symptoms of mosaic virus I, revising and extending Thung's description. There was little opportunity to study mosaics II and III, but it seems probable that the former may in fact be a physiological response to unfavourable conditions for growth.

In trials with a number of vectors mosaic virus I was transmitted at Bogor, Indonesia, by the aphid *Orosius argentatus* alone, which proved also to be a vector of witches' broom, though only about one-third of the attempted transmissions were successful. *Aphis craccivora* [36, p. 231] did not transmit mosaic. Virus was latent in *Orosius argentatus* for at least eight days, and some insects remained infective for 77 days. Suitable crop rotation gives the best control of mosaic I, and there are indications that weekly spraying with 0·1 per cent. DDT may reduce the percentage of diseased plants.

Hemingway (J. S.). **The resistance of Groundnuts to Cercospora leaf-spots.**—*Emp. J. exp. Agric.*, 25, 97, pp. 60–68, 1957.

In further studies on the resistance of groundnuts to *Cercospora personata* [*Mycosphaerella berkeleyii*: 36, p. 232] and *C.* [*M.*] *arachidicola* [loc. cit.] at the experimental farm of the Tanganyika Agricultural Corporation, from 29 varieties from all parts of the world showing some resistance, Kanyoma and Mwitunde [35, p. 342] were selected for a detailed investigation of the characters governing resistance. Some degree of resistance was invariably associated with a dark green colour and both Kanyoma and Mwitunde had thicker palisade tissue than the susceptible and paler Natal Common. The average lesion area on 120 random samples of Natal Common was $10{\cdot}97 \times 10^{-3}$ sq. in. for *M. berkeleyii* and $16{\cdot}29 \times 10^{-3}$ sq. in. for *M. arachidicola*, the corresponding figures for Kanyoma being 4·54 and $6{\cdot}08 \times 10^{-3}$, respectively. Daily increases in lesion area were greatest in the susceptible variety, probably because of their less substantial tissues.

The majority of leaf infections took place through the upper epidermis and approximately 30 per cent. of germinating conidia achieved penetration, which took place through stomata. Natal Common possessed a greater proportion of large and long stomata than Kanyoma and Mwitunde. It is probable that initial infection of susceptible varieties is dependent on the frequency of stomata of penetrable size.

Zappalà (A.). **La 'Peronospora della Vite' nella Sicilia orientale. Osservazioni biologiche.** [Downy mildew of the Vine in eastern Sicily. Biological observations.]—Reprinted from *Tec. agric.* (*1956*), 11–12, 15 pp., 3 graphs, 1956.

Brief notes are given on the outbreaks of vine downy mildew (*Plasmopara viticola*) that have occurred in eastern Sicily since 1887 in relation to their severity and the prevailing weather conditions, and on the dates of oospore formation in different localities in the winters of 1953–4 and 1954–5. Only negligible numbers of

oospores appear to germinate in this area, and germination was not observed by the author.

Ciccarone (A.). **'Peronospora', 'Oidio', e defogliazione della Vite.** ['Peronospora', 'Oidium', and defoliation of the Vine.]—*Tec. agric.* (*1956*), 3–4, pp. 87–92, 1 fig., 1956.

The author discusses in broad outline the question whether the early defoliation of vines treated against *Plasmopara viticola* or *Uncinula necator* with zineb in Sicily is due in part to the use of this substance or represents a more normal shedding of leaves, in contrast to the retardation of leaf fall which may be caused by copper in slowing down the growth of the vine.

Chen (P.-C.). **Notes on Myriangiales in Formosa. I.**—*Plant Dis. Reptr*, 40, 12, pp. 1128–1131, 3 figs., 1956.

Included in this preliminary, annotated list of *Elsinoe* and *Sphaceloma* species in Formosa [cf. 35, p. 723] is *E. ampelina* on vine [map 234].

Taylor (R. H.). **Cylindrocarpon radicicola Wr.: the recording of a new fungus on Grapes in Victoria.**—*J. Aust. Inst. Agric. Sci.*, 22, 4, pp. 291–292, 1 fig., 1956.

In December, 1955, severe shedding of Ohanez grape berries occurred in the Mid-Murray area of Victoria. Small black necrotic spots were scattered over the pedicels and blossom-ends, and from these lesions *Cylindrocarpon radicicola*, not, apparently, previously recorded on grapes, was isolated. Inoculation experiments on the Gordo Blanco variety showed the fungus capable of penetrating only when the skin of the berries was broken, and to be much less pathogenic on more mature fruit. Unfavourable weather in this instance had apparently rendered the fruit liable to attack.

Garber (E. D.) & Goldman (M.). **The response of Grape tissue cultures to inoculation with biochemical mutants of Erwinia aroideae.**—*Bot. Gaz.*, 118 (*1956*), 2, pp. 128–130, 1957.

In further studies at the Department of Botany, University of Chicago, when biochemical mutants of *Erwinia aroideae* [35, p. 752] requiring specific amino acids were added to the surface of intact or macerated vine tissue cultures, the rates of attack differed in two respects: macerated surfaces responded more quickly and strongly than intact ones, and the various mutants differed in rate of attack. These results are considered to reflect the concentration of the required nutrients at the site of inoculation.

Weidel (W.). **Virus.**—186 pp., 27 figs., 4 diags., Berlin, Springer-Verlag, 1957. D.M. 7.80. [German.]

This small book, intended purely as a general and popular introduction to the subject, explains the nature of the viruses and the animal and plant diseases caused by them, outlining, among other things, the techniques of isolation, culture, microscopic study, and quantitative measurement. The photographs are of high quality.

Jones (J. P.). **Studies on the auxin levels of healthy and virus infected plants.**—*Diss. Abstr.*, 16, 9, pp. 1567–1568, 1956.

At the University of Nebraska the concentrated expressed sap of tobacco and tomato plants, both healthy and infected with tomato spotted wilt or tobacco mosaic viruses, was assayed for auxin level, which was sometimes higher in the infected plants. Whether this might be responsible for the appearance of symptoms was not determined.

Lange (C. T.) & Desjardins (P. R.). **A micro switch-actuated lesion counter for use in plant virus studies.**—*Plant Dis. Reptr*, 40, 12, pp. 1095–1096, 1 fig., 1 diag., 1956.

From the Citrus Experiment Station, University of California, Riverside, a description is given of an electrical recording lesion counter for use in virus studies, similar in construction to one described previously [33, p. 616] but more economical, as the battery replacement has been eliminated. The new model can be constructed for less than $20.

Hein (Alice). **Beiträge zur Kenntnis der Viruskrankheiten an Unkräutern. I. Das Malva-Virus.** [Contributions to the knowledge of virus diseases of weeds. I. The *Malva* virus.]—*Phytopath. Z.*, 28, 2, pp. 205–234, 8 figs., 1956.

This is a comprehensive, fully tabulated account of studies, commenced in 1952 at the Phytopathological Institute of the Martin Luther University, Halle-Wittenberg, and continued from 1953 to 1955 at the Institute for Phytopathology, Aschersleben, Germany, on a vein-clearing virosis of *Malva sylvestris* and *M. neglecta* [cf. 26, p. 256] which was identified as Ruizhkov's *Malva* virus 1 [26, p. 528]. Two strains were isolated, a green and a yellow. The virus was shown to be transmissible mechanically and by *Myzus persicae*, in which it is non-persistent. The thermal death point lies above 64° C., the dilution threshold ranges from 1 in 100 to 1 in 500, and ageing *in vitro* is withstood for 120 hours.

Inoculation experiments gave positive results on several *Malva* spp. besides the above-mentioned, *Abutilon theophrastii* [cf. 27, p. 566], *Lavatera arborea*, *Althaea officinalis*, *Anoda cristata*, and *Hibiscus trionum*, but *Gossypium* sp. and hollyhock did not react.

The binomial designation proposed for the virus is *Marmor malvae* n.sp., the green and yellow strains being differentiated as vars. *vulgare* and *chlorogenus*, respectively.

Schmelzer (K.). **Beiträge zur Kenntnis der Übertragbarkeit von Viren durch Cuscuta-Arten.** [Contribution to the knowledge of the transmissibility of viruses by *Cuscuta* species.]—*Phytopath. Z.*, 28, 1, pp. 1–56, 19 figs., 1 graph, 1956.

Further experiments in the current series are reported from the Institute for Phytopathology, Aschersleben, Germany [36, p. 173], to determine the suitability of nine species of dodder as virus-carriers [cf. 24, p. 136 *et passim*]. *Cuscuta campestris* [23, p. 317], *C. californica*, *C. subinclusa*, *C. gronovii* [36, p. 157], *C. americana*, *C. europaea*, and *C. epithymum* were almost uniformly effective in the transmission of the ordinary green strain of cucumber mosaic virus to *Nicotiana glutinosa*, but only six out of 40 tests with *C. lupuliformis* gave positive results. The last-named also failed completely in tests with a virulent green strain of the same virus, isolated in 1952 from a mixed infection with potato virus Y on tobacco, and with Noordam's yellow (chrysanthemum) strain [see above, p. 446], which was also less readily transmitted than the ordinary green strain by *C. californica* and *C. europaea*.

C. campestris, *C. subinclusa* (red- and white-leaved), *C. europaea*, and *C. epilinum* transmitted lucerne mosaic virus to Samsun tobacco more or less effectively, while *C. lupuliformis* did so in two out of five tests. *C. campestris*, *C. subinclusa* (red), and *C. europaea* also gave positive results in a few experiments on *N. glutinosa*. *C. californica* and *C. epithymum* did not act as carriers either in this series or in tests with tobacco [potato] stem-mottle (from tobacco, potato, and *Sonchus arvensis* [35, p. 118]). *C. campestris*, *C. gronovii*, and *C. lupuliformis* were the most efficient carriers of the latter virus to tobacco, while relatively satisfactory

results were obtained in tests with *C. europaea* and the red-leaved form of *C. subinclusa*.

Tobacco etch virus was transmitted to tobacco only by *C. lupuliformis*.

All the dodders gave negative results in transmission experiments with bean yellow mosaic virus, potato virus Y, and potato bouquet virus [36, p. 116].

C. californica was a reasonably good carrier of tomato spotted wilt virus to *N. glutinosa* in winter (December and January) experiments. Tobacco mosaic virus was also more readily conveyed to tobacco by *C. campestris* during the period from November to February than in the spring or summer.

Stem necroses developed on plants reacting to the transmission by dodders of cucumber and lucerne mosaic and potato stem mottle viruses by local lesions on the leaves. An anatomical examination of affected broad bean and cowpea stems revealed that cell complexes in process of becoming sclerenchymatous were the principal sites involved.

In general, the viruses were readily demonstrable in the expressed sap of the dodders acting as carriers. In accordance with the results of transmission tests the amounts of tobacco mosaic virus in *C. campestris* were much larger during the winter than at other times of year. Cucumber mosaic and potato stem-mottle viruses induced pathological symptoms, the former, e.g., on *C. campestris* and the latter on *C. lupuliformis*.

Dale (J. L.). **Tobacco mosaic virus infection of Bean as influenced by leaf treatments.**—*Diss. Abstr.*, 16, 9, p. 1566, 1956.

At the University of Illinois bean [? *Phaseolus vulgaris*] leaves inoculated with tobacco mosaic virus in 0·1 M phosphate buffer at pH 8·5 were subjected to various rinse treatments [cf. 35, p. 865]. Immediate rinsing in distilled water for periods of up to one minute caused a sharp decrease of infection, amounting to 75 per cent. with the one-minute rinse. One-minute rinses with a solution at pH 3 caused greater infection than with one at 3·7 or 5·5; maximum infection followed a 9·5 rinse. Reduced infection from rinsing with distilled, deionized, and tap water was correlated with pH.

There was a decrease of infection with increase in the temperature of rinsing water over the range 5° to 45° C.

The optimum phosphate concentration for infection was 0·05 M when leaves were rinsed for one minute in phosphate buffers at pH 8·5. Sodium phosphate, carbonate, or sulphite solutions at pH 8·5 caused an increase of infection of about 70 per cent. when applied immediately, but little or none when applied one or four hours after inoculation. Water rinses reduced infection more in old than in young leaves. Sodium or calcium chloride solutions greatly increased infection up to 0·1 M salt concentration. It seemed likely that the rinses influenced the attachment of virus particles to the surface of the protoplasm of the injured cells.

Blattný (C.) & Limberk (J.). **Implantace úlomků pletiv jako způsob pro přenos stolburu.** [The suitability of implantation of tissue fragments for the transmission of stolbur.]—*Preslia* (formerly *Studia bot. čechosl.*), 28, 4, pp. 413–414, 1956. [German summary.]

The implantation of thin sections of stem tissue from *Convolvulus arvensis* infected by stolbur [tomato big bud virus: cf. 36, p. 88] into the stems produced infection in one out of 60 tomato plants and six out of 60 Samsun tobacco plants in experiments carried out in summer 1955 in Czechoslovakia. In autumn the procedure caused the premature death of the test plants. The virus was not transmitted to *Nicotiana rustica* or *Pharbitis* [*Ipomoea*] *purpurea*.

In 1956, using crushed leaf material, infection was transmitted to five out of 50 Samsun tobacco and three out of 100 tomato plants [36, p. 283]. Though

inferior to grafting for transmission studies, the implantation method may be recommended where grafting is impossible. It may offer some promise for the mechanical transmission of such viruses as the related [European] yellow virus [loc. cit.], which is not transmitted by abrasion with sap.

Plant Pathology Division.—*Res. & exp. Rec. Minist. Agric. Nth. Ireland*, 4 (*1954*), pp. 91–100, 1956. [Received 1957.]

It is stated in this report [cf. 35, p. 152] that the incidence of *Fusarium* spp. as seed-borne contaminants of oats in Northern Ireland is often sufficient to result in epidemic outbreaks when conditions favour disease, and that although dusting the seed with organo-mercurials may reduce the incidence at sowing it does not lessen seed contamination in the resultant crop.

Evidence was obtained of the existence in Belgium, England, and Northern Ireland of several physiologic races of *Polyspora lini* attacking flax. Stem-break caused by this pathogen was doubled by the addition of phosphate to the soil in pot tests.

The cabbage variety Wisconsin 8353T was highly resistant to *Plasmodiophora brassicae* [cf. 34, p. 85] in trials where the spore load used for soil inoculation was low (10^3 spores per gm.), but as this was increased (to 10^7), resistance diminished.

Among isolates of *Phytophthora infestans* from potato [35, p. 319], race 4 was dominant throughout the country. In the autumn and winter of 1954 cases were observed of dry rot of potatoes due to *Fusarium avenaceum* and *F. caeruleum*, the latter being the more prevalent.

Further investigation of the control of rose rust (*Phragmidium mucronatum*) showed that spraying should begin before mid-May. Against black spot (*Diplocarpon rosae*) spraying with SR. 406 [captan] at 2 lb. per 100 gals. or 0·5 per cent. oil-Bordeaux mixture was most effective when begun in early April. Symptoms of virus disease [unspecified] were observed on some rose varieties.

In the section dealing with the health of seeds and planting stocks (pp. 96–99) it is noted that 78 per cent. of the 236 samples of oat seed examined were contaminated with *Helminthosporium* [*Pyrenophora*] *avenae* (6·4 per cent. of the seeds infected), 100 per cent. with *Fusarium* spp. (6·9), and 8·5 per cent. with *Ustilago* spp.

The potato variety Ulster Dale was found to be susceptible to virus X, but not to crinkle (viruses X plus A) [cf. 33, p. 109]. In serological and indicator plant tests of 750 leaf samples from various sources only a mild strain of virus X was present to any extent, 22 per cent. of the samples being infected. Some deterioration of Arran Pilot near Moy, County Tyrone, was due to virus Y.

In the section on advisory work (pp. 99–100) the occurrence of manganese toxicity is noted in a potato crop on very acid soil, necrotic lesions on the leaves, particularly along the veins, being very pronounced.

Blanchet (R.). **Répercussions de la carence magnésienne sur la physiologie et la production du Pommier.** [Repercussions of magnesium deficiency on the physiology and yield of the Apple tree.]—*Rev. hort., Paris*, 129, 2216, pp. 1606–1609, 1 fig., 4 graphs, 1957.

After briefly noting the symptoms of magnesium deficiency in apple trees [cf. 32, p. 24; 35, p. 419] and mentioning diagnosis by leaf analysis, the author describes his own experiments at L'École Nationale d'Horticulture, Versailles, France, on the effect of the condition on the leaves, flowers, fruits, and branches, and on the production of wood and on yield. Cure by applications to the soil of magnesium sulphate is recommended.

The current branch growths and old leaves are very often deficient, though the flowers, fruits, and very young leaves have a normal content, as the element migrates from the old leaves to the young ones or the fruits. The reduced assimila-

tion that results from necrosis and premature defoliation causes a marked reduction in fruit yield and in wood production, at least in severe cases. Several soil applications of magnesium sulphate made annually at the rate of 300 kg. per ha. have not yet completely cured the condition in experimental plots.

Jahresbericht 1954/1955 der Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil. [Annual report for 1954–5 of the Federal Experiment Station for Fruit-Growing, Viticulture, and Horticulture at Wädenswil.]—*Annu. agric. Suisse*, (57), N.S., 5, 8, pp. 855–956, 6 figs., 1 diag., 1 graph, 1956.

Most of the information in this report, compiled by F. Kobel [cf. 34, p. 210], has already been noticed from other sources, but the following items from the sections on plant protection (pp. 863–871), phytopathology (pp. 882–893), and horticulture (pp. 940–948) may be mentioned. C. Zäch states that applications were made for nine sulphur and copper preparations, 23 organic fungicides, seven seed dressings, and 14 combined fungicides and insecticides to be placed on the market, of which six, 13, five, and eight, respectively, were approved or registered.

L. Stalder comments on the increasing prominence of onion yellow dwarf virus [map 46], which in 1955 contributed to a reduction in seed yield from an average of between 6 and 10 to 2 kg. per are [119·6 sq. yds.].

A. Osterwalder, F. Schütz, and W. Vogel reported in *Schweiz. Gartenbaubl.*, 76, p. 657, 1955, that a species of *Olpidium* is responsible for die-back of *Erica gracilis*. It occurs as protoplasmic globules, sporangia, and resting spores in the epidermal cells of the finest root branches. Since the fungus is transmissible exclusively by soil, new plantings must be established on a healthy site and contamination by infected refuse or old soil, pots, frames, and the like strenuously avoided.

Science Service Laboratory, London, Ontario.—*Rep. Sci. Serv. Lab. Dep. Agric. Can., 1951–56*, 47 pp., 4 figs., 1956.

In the Fungicides section (pp. 9–13) it is reported that plants sprayed with nabam and kept in the dark in closed chambers were severely injured, whereas those similarly sprayed but not kept in the dark were unharmed. The damage resembled that known to be produced by carbon disulphide and hydrogen sulphide, which are among the products resulting from the breakdown of nabam under acid conditions. It is assumed that an accumulation of carbon dioxide in the surface water film on the leaves of the darkened plants provided the acid conditions for this decomposition. That a shift of pH at the leaf surface may result in acid breakdown of nabam, yielding products innocuous to fungi in contrast to the non-acid breakdown which gives the fungicidal ethylene thiuram monosulphide [34, p. 738], may explain the inconsistent results obtained in the field. The important conclusion from this is that direct use of ethylene thiuram monosulphide or its polymer would preclude the possibility of such undesirable decomposition, which is responsible also for the erratic results with zineb and maneb.

A substance with properties closely similar to that produced by the aeration of dilute nabam solutions [33, p. 166] has been produced commercially under the name thioneb. Both thioneb and ethylene thiuram monosulphide are reported to have controlled scab [*Venturia inaequalis*: 33, p. 431] and cedar rust [*Gymnosporangium* spp.: loc. cit.] on apple in tests at the New York Agricultural Experiment Station, Geneva. At the Science Service Laboratory, St. Catharines, both gave results superior to standard fungicides in the orchard control of the blossom blight and fruit rot stages of peach brown rot [*Sclerotinia fructicola*]. There is evidence, obtained by the infra-red spectroscopy [36, p. 111] of chloroform solutions, that nabam becomes fungicidal by breakdown to ethylene thiuram monosulphide and thence to ethylene isothiocyanate [cf. 35, p. 310].

In a study of a series of quinoline derivatives only 8-quinolinol and 2-methyl-8-quinolinol and their copper chelates were appreciably toxic to spores of *S. fructicola*. In this series the requirements for toxicity were a quinoline nucleus and the ability to form chelates of high lipoid solubility.

Phytotoxicity of synthetic N-*n*-alkyl ethylene thioureas to seeds and roots in sand was greatest with the amyl and hexyl homologues, though with cut shoots the octyl member was most phytotoxic. This homologue, with its high oil-to-water coefficient, cannot enter intact roots and its phytotoxicity is thus denied expression, whereas the amyl member has a coefficient which permits its entry.

In the section of Ecological Chemistry (pp. 31–34) it is reported that, contrary to general experience, *Helminthosporium sativum* [*Cochliobolus sativus*] grows well in culture if its growth requirements are met. With good aeration excellent growth was obtained on a variety of media, though with sucrose or dextrose as the sole organic constituent growth was slower. Toxin production was best with an organic source of nitrogen. Peptone was ruled out, however, because it partially inhibited the germination of barley and gave rise to degradation products complicating the extraction of toxin. Potato dextrose or potato sucrose liquid medium was finally adopted. Maximum toxin production coincides with the onset of autolysis.

Growth but not toxin production increased with the concentration of the medium. Culture filtrates retain their activity over a wide pH range. Some loss of activity occurs on heating at 60° C. for 16 hours at pH 10, but none at pH 4. Both the residue and the distillate from vacuum flash evaporation were active. Extraction of the residue with chloroform after preliminary precipitation with alcohol removed all activity, but yielded a product which at 100 p.p.m. completely inhibited the germination of *Sclerotinia* spores and at 200 p.p.m. that of barley seed. The active product in the distillate was as potent as that in the residue.

Report of the Waite Agricultural Research Institute, South Australia, 1954–1955.—74 pp., [? 1956. Received March, 1957.]

In the section of this report [cf. 35, p. 356] dealing with plant pathology (pp. 27–31) it is stated that *Urophlyctis alfalfae* [35, p. 351] occurred extensively on subterranean clover in South Australia in the wet winter of 1955. On lucerne *Peronospora trifoliorum* [34, p. 284] and *Uromyces striatus* increased in severity; *Pseudopeziza medicaginis* was common, but less damaging.

Glasshouse tomatoes are still seriously damaged by *Verticillium* wilt [*V. albo-atrum*: cf. 29, p. 62]. *Fusarium* wilt of peas [cf. 22, p. 342] has become more prevalent on irrigated soils; bacterial blight (*Pseudomonas pisi*) [34, p. 201] is scattered, and occasionally severe after hail or frost damage. Stem rot of field and garden peas caused by *Ascochyta pinodella* and *Mycosphaerella pinodes* [cf. 35, p. 64] is recurrent and may cause serious loss in gardens. There is evidence that these pathogens are soil-borne, *A. pinodella* possibly occurring where peas have never grown. *Sclerotinia* [*sclerotiorum*: 35, p. 354] is troublesome on a number of vegetable crops.

A breakdown of tissue round the stone in apricots and peaches in irrigated areas has caused serious losses; no associated pathogen has been found. Symptoms resembling ring pox virus [cf. 34, p. 304] were observed on apricots in two orchards. Infectious degeneration [court-noué: cf. 36, p. 165] appears to be common on vines in South Australia; symptoms resembling bacterial blight (*Erwinia vitivora*) [cf. 35, p. 588] have also been observed and both diseases are under investigation. In neither year under review did incipient outbreaks of *Plasmopara viticola* [cf. 35, p. 354] become serious. Bacterial blight of pears and stone fruits (*Pseudomonas syringae*) [35, p. 3] was serious in the Adelaide Hills in 1954.

Botrytis gladioli [cf. 34, p. 38] caused considerable losses of gladiolus in Adelaide,

and *B. tulipae* was recorded for the first time in Australia, causing tulip fire on a property in the Adelaide Hills. Virus diseases of dahlias [cf. 36, p. 86] are now widespread.

Gloeotinia temulenta [29, p. 156] is newly recorded on rye grass [*Lolium* spp.] in South Australia, occurring often on seed from the south-east, but seldom from the mid-north.

A latent virus disease of cherries, widespread but severe only on three local seedlings, resembles Lambert mottle [cherry necrotic rusty mottle: cf. 33, p. 611; 35, p. 689]. Two other common viruses of cherry resemble black canker and tatter leaf [peach ring spot]. Plums are affected by a mosaic line pattern [? virus] disease of minor importance. Peach wart virus [cf. 33, p. 734] on three peach trees of J. H. Hale and Early Crawford is a new record for Australia.

Observations indicate that the rarity of seed transmission of common bean mosaic virus [cf. 35, p. 741] is due to its inability to infect the gametophytic cells of the host [*Phaseolus vulgaris*], or the developing embryo owing to lack of protoplasmic connexion with the surrounding tissues through the plasmodesmata and of vascular connexion between the embryo and parent tissues.

Studies in a wheat field at the Institute show that the onset of the wet season and the ploughing in of plant residues are the major factors affecting activity of soil fungi, some of which have a relatively short period of growth in the soil, surviving the rest of the year as spores, while others are always present as mycelium.

Report of the Department of Agriculture, N.S.W., for the year ended 30th June, 1955.—103 pp., 20 figs., 1956.

Much of the information in the plant pathology section of this report (pp. 58–64), submitted by the Biological Branch of the Division of Science Services [cf. 35, p. 422], has already been noticed from other sources [cf. 35, p. 877]. Among the newly recorded plant diseases is *Fusarium oxysporum* on rock melon [35, p. 343].

The development of wheat stem rust (*Puccinia graminis*) [35, p. 351] occurred too late in the season to cause appreciable damage; the variety Festival showed good resistance to the prevalent races. Gabo was very susceptible to flag smut (*Uromyces tritici*) [*Urocystis tritici*: 35, p. 173]. Some cross-bred maize lines showed promising resistance to *Puccinia sorghi*. Two new minor maize diseases occurred on these plants; anthracnose (*Colletotrichum graminicola*) [36, p. 177] and a *Cercospora* leaf spot.

Some sugar-cane crops were damaged by Fiji disease virus [35, p. 352]. Ratoon stunting virus [34, p. 630] and *Fusarium moniliforme* [*Gibberella fujikuroi*] were also present.

In early summer and early autumn subterranean, red, and white clovers were heavily attacked by *Uromyces trifolii* [35, p. 351]. Ring spot (*Stemphylium sarciniforme*) [34, p. 726] damaged some red clover pastures. Diseases prevalent on lucerne included *Uromyces medicaginis* and *Pseudopeziza medicaginis*.

Several acres of cowpea were destroyed by a stem rot due to *Phytophthora* sp. [cf. 35, p. 352]. On the north coast bean [*Phaseolus vulgaris*] crops were affected by the worst outbreaks of anthracnose (*Colletotrichum lindemuthianum*) [35, p. 878] for many years. Rust (*Uromyces phaseoli typica*) [*U. appendiculatus*: loc. cit.] was also unusually severe during the winter.

Surveys of potato crops revealed that neither leaf roll virus [34, p. 475] nor mosaic is a significant source of rejection for certification. The incidence of [tomato] spotted wilt virus [loc. cit.] and purple top wilt [tomato big bud virus] on potatoes was also low. Many imported potato strains show resistance to the common local race of *P. infestans*.

The mid-season tomato variety Grosse Lisse possessed satisfactory commercial resistance to *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici*. The American

variety Manalucie was highly resistant to all New South Wales isolates of this pathogen in greenhouse tests. In further studies on the yellow top disease of tomatoes [35, p. 493] the causal virus was transmitted to potato, *Datura stramonium*, and *D. inoxia*; commercial crops were severely diseased and spray programmes had no effect.

Club root (*Plasmodiophora brassicae*) of cauliflower was widespread in the Sydney metropolitan area. In preliminary trials good control was obtained by dipping seedling roots in a sludge of 4 per cent. calomel in talc and incorporating a similar mixture in the transplant sites.

Broad bean wilt virus [35, p. 661] appeared to be well established in the Sydney area; sweet peas were severely affected and other hosts included gladioli, lilies, and *Ranunculus* spp.

An outbreak of mushroom bubbles disease (*Mycogone perniciosa*) occurred where the casing soil had not been sterilized.

Several outbreaks of citrus psorosis A virus [35, p. 365] have been under investigation. The symptoms resembled those of severe psorosis B which is now considered to represent the shock symptoms of psorosis A when newly introduced into a healthy tree; the New South Wales outbreaks therefore suggest the presence of an insect vector. A second type of psorosis observed appears to be similar to Florida gummosis [cf. 34, p. 782]. The development of [bacterial] brown spot of mandarin [35, p. 422] was favoured by wet weather in summer and autumn, causing heavy losses in parts of the Windsor district. In spray trials fixtan and zineb showed promise, as did phenyl mercury chloride, but this caused some fruit injury; streptomycin was ineffective. The use of autumn Bordeaux mixture sprays in the Murrumbidgee Irrigation Area reduced losses from *Septoria* [sp. unspecified: cf. 30, p. 558] on citrus to negligible proportions. Many mature-to-old citrus trees on rough lemon stock were affected by root rot (*Phytophthora citrophthora*) [35, p. 365] following the excessively wet period from January to June. Citrus sudden death [at present of unknown origin] occurred in a number of orchards, 12 per cent. of the trees being lost in one planting.

For the seventh successive season the peak period for the discharge of ascospores of *Venturia inaequalis* [35, p. 661] coincided with petal-fall. In a heavy crop season a Granny Smith apple trial yielded better after lime-sulphur treatments than after thiram (9 and 6 bush. per tree, respectively) due to thinning by the latter, but in a light crop season the reverse occurred, the figures being 1 and 5. Satisfactory control of *V. inaequalis* on young, non-bearing trees was achieved by low concentrations of mercury fungicides following infection. In an orchard which received an eradicant phenyl mercuric chloride (0·3 per cent.) spray [36, p. 192] in autumn and none in the growing season, lesions did not develop until early December, whereas in neighbouring plantings receiving the full schedule of spring sprays but no autumn spray, lesions were present in early November. Bud and spur blight of apple, caused by *Botryosphaeria ribis*, was controlled by thiram [cf. 35, p. 379].

In a spraying trial against brown rot (*Sclerotinia fructicola*) [35, p. 352; 36, p. 412] of stone fruits two preharvest applications of captan to Pullar's Cling peaches reduced infection from 39 to 10 per cent. and ziram to 13 per cent. These fungicides compared favourably with dry-mix lime-sulphur, and, unlike it, did not interfere with the development of fruit colour. Thiram in small-scale experiments with nectarines, cherries, and plums also gave satisfactory control of brown rot and did not affect fruit set. The mosaic disease of plums has been ascribed to plum line pattern virus. Experimental foliage sprays of weak Bordeaux mixture gave better control of prune plum rust (*Puccinia pruni-spinosae*) [34, p. 794] than thiram or lime-sulphur, but caused some leaf damage. Peach leaf curl [*Taphrina deformans*: loc. cit.] was controlled in concentrate spray trials by thrice normal D.M.C. [1, 1-bis (p-chlorophenyl) ethanol] and twice the normal concentration of Bordeaux mixture.

In trials against vine black spot (*Elsinoe ampelina*) [34, p. 283] phenyl mercury nitrate proved ineffective, while thiram and ziram were better than Bordeaux and gave good control. Severe downy mildew (*Plasmopara viticola*) [34, p. 284] occurred in vineyards where thiram was used throughout the season but zineb at monthly intervals gave control equal to Bordeaux mixture. In the Murrumbidgee Irrigation Area vines sprayed with zinc-Bordeaux (10–2–7–100) yielded better than those sprayed with Bordeaux (6–4–100) despite rather poor control of *E. ampelina*. Control of *Botrytis* mould on sultanas was achieved by incorporating sodium orthophenyl phenate in the hot dip, followed by sulphur treatment on the racks. The new strawberry variety 1953·1 has been discarded owing to susceptibility to *Sphaerotheca humuli*, a disease not previously observed on the varieties at present grown in the State. Virus diseases of strawberries [32, p. 667] are now a widespread threat to commercial cultivation.

The rarely found *Uncinula australiana*, which occurs in the imperfect state on crepe myrtle [*Lagerstroemia indica*], was observed at Tamworth in 1955.

[Larter (L. N. H.).] **Notes on current investigations (research), April to June, 1956.**—*Malay. agric. J.*, 39, 3, pp. 220–227, 1956.

Isolations from padi rice seeds from plants in Malaya severely attacked by blast (*Piricularia oryzae*) [32, p. 119] in no instance gave rise to the fungus. Fungi isolated from such seeds and not before recorded on this host included *Fusicladina* sp., *Aspergillus tamarii*, *A. niger*, *Syncephalastrum racemosum*, *Rhizopus cohnii*, *Curvularia pallescens*, *C. fallax*, and *C. affinis*.

Calonectria rigidiuscula was found on cacao affected by die-back [34, p. 708] at Subang, Selangor, and Tangkak, Johore, as well as at the Federal Experiment Station, Serdang. Inoculation tests demonstrated that a species of *Gloeosporium* [32, p. 37] is responsible for a widespread spotting and distortion of cacao leaves.

The pathogenicity of *Curvularia* sp. to young leaves of oil palm seedlings was confirmed, the associated *Gloeosporium* being non-parasitic. Other diseases recorded on this host were a severe outbreak of bunch rot (*Marasmius palmivora*) and, for the first time, infection of young palms by *Ganoderma lucidum*.

Fruit collapse and heart rot of pineapple due to a species of *Erwinia* [cf. 33, p. 523] were recorded for the first time from South Perak, while heart rot was also present at the Federal Experiment Station, Jalan Kebun. The pathogen occurs in all the chief pineapple areas. The possibility that it may be a strain of *E. carotovora* is being investigated. Brown root disease (*Fomes noxius*) was a new record for mangosteen [*Garcinia mangostana*]. *Puccinia polysora* is widespread on maize. Interplanting tomato with maize reduced bacterial wilt [? *Pseudomonas solanacearum*] from 100 per cent. to 37.

Jefferiss (A.). **Annual Report of the Department of Agriculture, Seychelles, 1955.** —35 pp., [? 1957].

On p. 10 of this report [cf. 28, p. 431] the occurrence of mosaic virus on cassava is reported [map 184]. Tomato diseases include *Cladosporium fulvum* [map 77] and 'fungal wilts' [unspecified], which also affect eggplant.

Annual Report of the Department of Agriculture, Uganda Protectorate, for the year ended 31st December, 1955.—176 pp., 16 pl., 4 graphs, 1956. [Received March, 1957.]

In the Botany and Pathology section of this report (pp. 150–152) [cf. 35, p. 277] J. D. Jameson notes that Panama disease of bananas [*Fusarium oxysporum* f. *cubense*] was reported from two new areas. The cotton variety DE 715/6 proved resistant to black arm [*Xanthomonas malvacearum*: 36, p. 244] and wilt [*Verticillium dahliae*: 35, p. 524; 36, p. 27], but its spinning quality was doubtful. All cotton

seed was dressed with perecot [35, p. 890] or armasan dust; the greatest main stem infection by *X. malvacearum* noted was 15 per cent.

Dowson (W. J.). **Isolation of soft rot bacteria on Weiringa's pectate gel.**—*Nature, Lond.*, 179, 4561, p. 682, 1957.

The preparation of a pectate gel medium for the detection of the potato black leg organism (*Pectobacterium carotovorum*) [*Erwinia carotovora*: 36, p. 309] is described. A calcium agar containing 500 ml. soil extract, 0·5 gm. sodium chloride, 2·5 gm. calcium chloride, 0·5 gm. yeast extract, and 10 gm. agar and adjusted to pH 9 is autoclaved at 15 lb. for 15 mins., poured into Petri dishes in sufficient quantity to cover the bottom, and dried in a desiccator for two days. A pectin solution containing 2 per cent. sodium polypectate adjusted to pH 8 with N sodium hydroxide and autoclaved at 10 lb. for 2 mins. is poured on to the calcium agar and left to dry and set in a desiccator for just over a week. The plates are ready for use when no liquid exudes from between the layers when the plates are slanted.

Lapwood (D. H.). **Studies in the physiology of parasitism. XXIII. On the parasitic vigour of certain bacteria in relation to their capacity to secrete pectolytic enzymes.**—*Ann. Bot., Lond.*, N.S., 21, 81, pp. 167–184, 4 graphs, 1957.

In continuation of this series [cf. 35, p. 385] the author carried out a preliminary examination at the Imperial College of Science, London, of 39 bacterial isolates from various parts of Great Britain to determine the production of pectolytic enzymes and their pathogenicity to potato, as assessed by inoculation of whole tubers. This method was preferred as being more rigorous, because even weak pathogens can cause appreciable lysis of disks. No isolates combined high pathogenicity with low enzyme production, but a number, including several *Pseudomonas* spp., were non-pathogenic though they actively produced enzyme. Of 16 isolates selected for active production of pectolytic enzyme and re-tested, four were chosen for detailed study, three (*Flavobacterium* sp., *Pseudomonas* sp. (No. 169), and *Pseudomonas syringae*) being strictly non-pathogenic and one (*Bacterium* [*Erwinia*] *aroideae*) actively pathogenic in tuber tests.

Although all four organisms produced pectolytic enzyme of equal strength, only the pathogen was able to attack normal tuber tissue. Raising the water content of the tissue, however, by soaking or injection or both [cf. 31, p. 321] enabled the non-pathogens to attack the tissue to a comparable extent. In normal tissue inoculated and incubated at 25° C. the results were clear within 24 hours, the sequence of events being closely followed in tubers and potato extract cultures. In dilute extracts the pathogen grew rapidly, causing a drift towards acidity in the medium and producing detectable pectolytic enzyme within a few hours. The non-pathogens grew slowly, with no tendency towards acidity, and enzyme production was delayed.

These distinctions became progressively more marked as the strength of the extracts was increased, and they held good also for three other pathogenic species, *Bacterium carotovorum* [*E. carotovora*], *B. atrosepticum* [*E. atroseptica*] and *B. phytophthorum* [*E. phytophthora*].

On the basis of these findings the failure of the non-pathogens to attack normal potato tissue was attributed to their slower rates of growth and enzyme production, which allow the tissues sufficient time for protective suberization. This assumption was supported by the observation that no infection resulted if the inoculum was placed in the inoculation cavity after an interval allowing sufficient time for suberization to take place.

Bacteria were chosen for this study in preference to fungi in order to eliminate the factor of possible mechanical entry, which might have confused the picture.

Pathogenicity to King Edward tubers, which were used throughout the experiments, ran parallel with pathogenicity to Majestic and Home Guard tubers, turnip, carrot, and parsnip roots, and buds of Brussels sprouts.

Crowdy (S. H.) & Elias (R. S.). **Cacao diseases.**—*Outlook on Agric.*, 1, 2, pp. 64–69, 2 pl. (1 col.), 1956.

This general account of the principal diseases of cacao and their control indicates that conventional plant pathological methods such as cultural practices and chemical treatment can be used to overcome them and suggests that the plant breeder should give priority to obtaining high yields that will make disease control programmes an economic proposition.

Desrosiers (R.). **Diferenciación entre variedades de Cacao con base a su susceptibilidad a la infección con Ceratostomella fimbriata (E. and H.) Elliott, en El Ecuador.** [Differentiation between Cacao varieties on the basis of their susceptibility to infection by *Ceratostomella fimbriata* (E. & H.) Elliott, in Ecuador.]—*Turrialba*, 6, 3, pp. 48–52, 1 fig., 1 diag., 1956. [English summary.]

This is a tabulated survey of comparative observations on the reactions to *Ceratostomella* [*Ceratocystis*] *fimbriata* of a collection of cacao varieties planted in blocks at the Tropical Experiment Station, Pichilingue, Ecuador [36, p. 233], during 1946 and 1947. Out of a total of 96 eight-year-old Criollo type trees 52 were diseased or dead, compared with only three diseased (none dead) out of 119 of the Forastero and Trinitario varieties of the same age. Large Criollo plantings, therefore, are likely to suffer heavy damage from *C. fimbriata*, while in Trinitario (hetereogeneous hybrids) susceptibility will probably be limited to segregates with a high predominance of Criollo germ plasm.

Parmentier (G.). **Techniques d'études des races physiologiques d'Erysiphe graminis (DC.).** [Methods for the study of the physiologic races of *Erysiphe graminis* (DC.).]—*Parasitica*, 12, 4, pp. 117–124, 1 fig., 1 diag., 1956.

The author's method of studying physiologic races of *Erysiphe graminis* by means of single-spore inoculations of cereals [35, p. 600] is further described. Much importance is attached to the use of host varieties possessing the greatest possible constancy in their characters, and to securing aseptic inoculation. Specially constructed glass containers are used, which are covered with cellophane, and contain a small receptacle in which two seeds of a test-variety have been sown in sterilized leaf-compost. To ensure the constant character of the inoculum three seeds of a susceptible host variety are sown in each of four small vessels placed in a glass container. The first vessel is watered, and the seedlings inoculated when 10 cm. tall. As these age, the other vessels are watered in turn, to produce a succession of host seedlings on which the fungal strain can be maintained for six weeks without contamination. Fluorescent lighting is used, 16 tubes each giving 2,500 lux irradiating 1 sq. m. of surface; the tops of the plants are finally a few cm. away from the tubes. The temperature is kept between 17° and 21° C. during lighting and between 10° and 14° during darkness.

Hardison (J. R.) & Meiners (J. P.). **New host records for dwarf bunt in the Pacific Northwest.**—*Plant Dis. Reptr*, 40, 12, pp. 1058–1060, 2 figs., 1956.

New grass hosts of *Tilletia controversa* [36, p. 392] in the Pacific Northwest are *Elymus canadensis*, infected in experimental plots on naturally infested soil in Oregon and Idaho, and *E. sibiricus* and *Festuca elatior* in the Oregon planting. The fungus was also found on rye for the first time in Montana and Idaho.

Campbell (W. P.). **The influence of associated microorganisms on the pathogenicity of Helminthosporium sativum.**—*Canad. J. Bot.*, 34, 6, pp. 865–874, 2 pl., 2 graphs, 1956.

A brief account of this work at the University of Toronto has already been noticed from another source [35, p. 8]. Six species of soil fungi from a root rot nursery were studied in association with *Helminthosporium sativum* [*Cochliobolus sativus*]. On unenriched soil-extract medium *Sclerotinia trifoliorum* and *Actinomucor repens* had little effect on the growth of *C. sativus*; *Phoma humicola* and *Epicoccum purpurascens* parasitized the mycelium. *Trichoderma viride* and *P. humicola* produced substances causing some inhibition. Only disruption of the mycelium of *C. sativus*, however, depressed its pathogenicity to an appreciable extent [cf. above, p. 454].

Levine (M. N.) & Hildreth (R. C.). **A natural occurrence of the aecial stage of Puccinia rubigo-vera var. tritici in the United States.**—*Phytopathology*, 47, 2, pp. 110–111, 1957.

The finding in Itasca State Park, Minnesota, of aecidia of the wheat rust *Puccinia rubigo-vera* [*P. triticina*] on *Thalictrum dioicum* [cf. 1, p. 166; 35, p. 596] is reported. The possible implications of such an occasional occurrence in relation to the appearance of new rust strains is noted, and it is recalled that *Isopyrum fumarioides* is the aecidial host in Eastern Siberia [17, p. 436] and that *I. biternatum* occurs in the United States central grain area, though Mains did not secure infection on it with this rust [12, p. 499].

Paikin (D. M.) & Glahov (P. N.). Новые фосфор- и хлорооргани́ческие препараты. [New phosphor- and chloro-organic preparations.]—Наука перед. Опыт сел. Хоз. [*Sci. advanced Exp. agric.*], *1957*, 2, pp. 41–43, 1957.

Trials in different localities in the U.S.S.R. for the evaluation of 50 per cent. hexachlorobenzene showed that it is harmless to human beings and animals and is very effective against wheat bunt [*Tilletia caries*: 35, p. 598]. In the Ukraine seed treatment of spring wheat with hexachlorobenzene (1·5 to 2 kg. per ton of seed) was 100 per cent. effective, whereas the mercurial preparation granosan (1 kg.) allowed 0·4 per cent. infection. In another test spring wheat seed treated with hexachlorobenzene (2 kg.) produced all healthy plants, while there was 29·3 per cent. infection among the untreated. In the Leningrad region there was 0·5 per cent. infection following treatment with hexachlorobenzene, as against 7·3 per cent. in the untreated. The 2 kg. per ton rate of application to winter or spring wheat seed immediately before sowing or 15 to 30 days earlier is, therefore, regarded as the most effective treatment against wheat bunt [see below, p. 462] and also against stripe smut of rye [*Urocystis occulta*: 34, p. 145].

Hsi (C. H.). **Toxicity of mercurial seed disinfectants to Wheat.**—*Plant Dis. Reptr*, 40, 12, pp. 1065–1070, 1 fig., 1956.

At the New Mexico Agricultural Experiment Station, State College, greenhouse experiments were carried out in 1955 on the phytotoxicity of several mercury seed disinfectants to Ponca and Cheyenne winter wheat [cf. 36, p. 391]. The best assessment of damage was obtained from a joint consideration of stand reduction and number of normal seedlings, the latter giving a more critical measure. The degree of injury increased proportionately with increasing rates of application; at 8 oz. per bush. reduction of stand was complete, except with puratized agricultural spray on Cheyenne. Of the fungicides tested panogen 1 was the least toxic followed by puratized agricultural spray, agrox, and ceresan M in that order. Ponca was more sensitive to mercury than Cheyenne.

NAKAGAWA (M.). **Studies on the resistance of Wheat varieties to Gibberella saubinetti. I. Genetical factors affecting susceptibility to Gibberella saubinetti of Wheat varieties. II. Relation of the 'variety-testing' and the 'seed reaction' to fusarial head blight (Gibberella saubinetti) in Wheat varieties. III. Alcohol fermentation by Fusarium fungus.**—*Bull. Div. Pl. Breed., Tokai-Kinki agric. exp. Sta.* 3, pp. 141–157, 1 fig.; pp. 158–170, 2 figs., 7 diags., 2 graphs; pp. 171–174, 2 figs., 1 graph, 1956. [Japanese, with English summaries.]

The first of these continued studies on ear scab (*Gibberella saubinetti*) [*G. zeae*] of wheat in Japan [cf. 36, p. 182] further elaborates the results of crosses made for resistance, information on which has already been noticed. The second paper reports correlation between the percentages of blighted spikes and of infected seeds, counts of the former being easier and more reliable in the determination of varietal resistance. The information in the third paper has been noticed from another source [35, p. 669].

MANNERS (J. G.) & BAMPTON (S. S.). **Fusion of uredospore germ tubes in Puccinia graminis.**—*Nature, Lond.*, 179, 4557, pp. 483–484, 1 fig., 1957.

During germination tests of the uredospores of *Puccinia graminis* from wheat in 0·5 *M* sucrose solution in a cavity slide at the Botany Department, University of Southampton, fusion of normal germ tubes was observed. Fusion occurred without the formation of 'fusion bodies' [27, p. 127]. It is suggested that nuclear exchange in such circumstances may be relatively frequent and that the genetical importance of such a phenomenon [cf. 35, p. 596] is considerable.

SWAEBLY (MARY A.). **Variability in the infection of Wheat by Puccinia graminis tritici and studies on extracts from rust urediospores.**—*Diss. Abstr.*, 16, 5, pp. 843–844, 1956.

In this study at the University of Minnesota of the host-parasite relationship between *Puccinia graminis tritici* and wheat three biotypes of race 15 B were found to have different inherent capacities for aggressiveness [cf. 35, p. 431] on Khapli emmer. The first rapidly killed the host cells, thereby restricting its own development, the second entered into a nutritional relationship just sufficient to ensure the formation of a few normal spores, and the third occasionally established itself sufficiently to sporulate well. The reaction of Kentana to races 11 and 15 B varied with temperature. At 80° to 85° F. the mycelium was abundant, the haustoria well developed, and the uredosori large, while host cell damage was at a minimum; at 65° to 70°, however, when the fungus developed poorly, damage to the host, including warting and swelling of the cell walls and corrosion and depletion of the chloroplasts, was marked. Kentana was often difficult to infect with certain races of stem rust, the fungus failing to enter the leaf although the uredospores germinated and appressoria were formed. Uredospores do not survive as well on the dry foliage of Kentana as they do on Little Club, and require a longer moist chamber period.

A heat-labile substance producing small flecks, leaf tip chlorosis, necrosis, and host cell damage similar to that in seedlings infected by uredial mycelium, was extracted from germinating uredospores of races 11, 15 B, and 56. Extracts from the different races vary greatly in pathogenicity and host reaction. Some varieties treated with 15 B extract were damaged more by subsequent inoculation with race 15 B than by either alone.

A heat-stable substance, extracted from germinating and non-germinating uredospores, stimulated the germination of old uredospores [cf. 36, p. 340].

SMITH (G. S.). **Inheritance of stem rust reaction in tetraploid Wheat hybrids. I. Allelic genes in Mindum durum × Vernal emmer.**—*Agron. J.*, 49, 3, pp. 134–137, 1957.

In a study conducted in 1939 and 1940 at the Field Crops Research Branch,

United States Department of Agriculture, Fargo, North Dakota, and the North Dakota Agricultural Experiment Station, field reaction to stem rust [*Puccinia graminis*] in Mindum durum × Vernal emmer wheat was inherited as a single factor difference [cf. 14, p. 619; 35, p. 5 *et passim*]. Seedling resistance to the prevalent race 17 was due to a single gene, Sr^v (from Vernal), which probably also confers field resistance. Seedling resistance to the uncommon race 147 was conditioned by Sr^m (from Mindum), allelomorphic to or closely linked with Sr^v. No progenies breeding true for resistance or susceptibility to both races were obtained.

Sazonov (P. V.). Опыт применения авиопрыскивания суспензией коллойдной серы посевов Пшеницы для защиты их от поражения бурой ржавчиной. [An experiment of applying aerosprays of colloidal sulphur suspensions to Wheat plantings for their protection against brown rust.]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 98–103, 1951. [Received 1956.]

In experiments in 1949 at the Kropotkin Cereal Farm in the Krasnodar region of the U.S.S.R. winter wheat plantings sprayed from aircraft, first in the spring and then two or three times more at intervals of 12 to 14 days with colloidal sulphur (10 kg. in 100 l. per ha.), were protected against brown rust (*Puccinia triticina*) [35, p. 437] under conditions of heavy infection, the average incidence being reduced by half.

Nilova (Mme V. P.) & Egorova (Mme G. N.). К биохимическому обоснованию устойчивости Пшениц к твердой головне. [Biochemical basis of resistance of Wheats to bunt.]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 78–84, 1951. [Received 1956.]

Studies were carried out on biochemical differences between wheat varieties with different degrees of resistance or susceptibility to bunt [*Tilletia caries*: see next abstract] in various regions of the U.S.S.R. Reduced temperature (Krasnoyarsk territory) and high humidity (coastal regions) increased susceptibility. In areas (Buryat-Mongol A.S.S.R.) with low humidity and high temperatures during the summer resistance was greater in both resistant and susceptible varieties. Resistance was found to depend on the content of free bicarbonate, amino acids, and arginine in germinating seeds. Variation in environmental conditions can influence changes in constituents of the developing plant, thus creating conditions unfavourable to the fungus.

Polyakov (I. M.) & Kalashnikov (K. Y.). Новые протравители для борьбы с твердой головней Пшеницы. [New disinfectants for the control of Wheat bunt.]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 91–97, 1951. [Received 1956.]

In trials in five regions of the U.S.S.R. of seed disinfectants against wheat bunt [*Tilletia caries*: see preceding abstract] 20 per cent. thiram (1 gm. per 1 kg. seed), while giving some control, still left up to 0·9 per cent. infection as against 1·2 to 4·8 per cent. in the untreated. Pentachloronitrobenzene (15 per cent. 1 gm.) and NIUIF-2 (granosan, 1 gm.) [cf. 35, p. 259] both eliminated infection as against 0·02 to 4·8 and 0·02 to 8·1 per cent. for the untreated. The latter, the most effective of the materials used, appeared to be bactericidal as well as fungicidal, stimulated plant growth, and increased yields by 14·1 to 26·4 per cent. in the Leningrad region; in Irkutsk, however, treatment of damper seeds reduced yields. Because of its high toxicity to human beings and animals, it requires careful handling. NIUIF-1 liquid (1 in 400) was also highly effective against the disease and increased yields by 12·9 to 43·7 per cent [cf. above, p. 460].

Chumakov (A. E.). Биологический метод обеззараживания почвы от возбудителя корневой гнили Пшеницы **Helminthosporium sativum P. K. et B.** [A biological method of eliminating from the soil the causal agent of root rot of Wheat, *Helminthosporium sativum* P. K. & B.]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 58–68, 1951. [Received 1956.]

The author emphasizes the importance of biological factors in the control of soil-borne fungal diseases. In experiments in the U.S.S.R. the wheat root rot pathogen, *Helminthosporium sativum* [*Cochliobolus sativus*: 21, p. 9], was successfully eliminated under conditions favourable to antagonistic soil organisms. These are more abundant and active under leguminous crops than under cereals, and the natural control of *C. sativus* can be furthered by the inclusion of lucerne in the crop rotation, autumn ploughing, and the application of compost and mineral fertilizers [cf. above, p. 460].

Niemann (E.). **Neue Wege zur Bekämpfung des Weizen- und Gerstenflugbrandes (Ustilago tritici (Pers.) Rostr. und U. nuda (Jens.) Rostr.) (Sammelbericht II).** [New methods for the control of Wheat and Barley loose smut (*Ustilago tritici* (Pers.) Rostr. and *U. nuda* (Jens.) Rostr. (Collective report II).]—*Z. PflKrankh.*, 64, 2, pp. 79–86, 1957. [English summary.]

Reference has already been made in this *Review* to most of the 46 papers cited by the author in this continuation of his survey of up-to-date methods for the control of wheat and barley loose smuts (*Ustilago tritici* and *U. nuda*) [35, p. 819], comprising cold-water soaking, chemical treatment, and anaerobic storage.

Shumilenko (E. P.). Опит подкормки Ячмена в ьорбье с полосчатой пятнистостью. [An experiment on manuring Barley against leaf stripe.]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 74–77, 1951. [Received 1956.]

Barley leaf stripe (*Helminthosporium gramineum*) [27, p. 13] causes serious losses in the Leningrad, Moscow, Voronezh, and other regions of the U.S.S.R. In field trials in 1946 application of ammonium nitrate (1·5 to 2 c[entner] per ha.) in the spring increased resistance to the disease. Of the 300 plants thus treated 93 per cent. developed infection as against 100 per cent. of the untreated. Yield was increased from 22 to 26 z. per ha.

Green (G. J.) & Dickson (J. G.). **Pathological histology and varietal reactions in Septoria leaf blotch of Barley.**—*Phytopathology*, 47, 2, pp. 73–79, 2 figs., 1957.

In this combined study from the Plant Pathology Laboratories at Winnipeg, Manitoba, and Madison, Wisconsin, on leaf blotch of barley caused by *Septoria passerinii* [2, p. 356; 36, p. 176], to which the variety Kindred is especially susceptible, inoculation was conveniently carried out in both field and greenhouse with a sprayed spore suspension in 0·5 per cent. gelatin. Abundant pycnidial formation in dead areas is a useful diagnostic feature. Temperatures of 20° to 24° C. are optimum for disease development. The strain of the fungus found abundantly on *Hordeum jubatum* [cf. 27, p. 528] is distinct from that pathogenic on cultivated barley.

The reaction of a number of varieties to the fungus is described. It enters the host by the stomata, and in susceptible varieties sparse intercellular hyphae, lacking haustoria, cause necrosis, chiefly confined to the mesophyll. In resistant varieties mycelial spread is restricted. Host reaction, consisting of a thickening of cell walls in contact with the parasitic hyphae, is more pronounced in resistant varieties. Varietal tests with 195 varieties of barley showed at least 53, mostly of the Coast or North African type, to be resistant, Feebar being especially so. Most of the Manchurian type varieties tested were susceptible, though Dorsett and Gatami showed resistance.

McKinney (H. H.). **Atsel Barley, a test plant for wheat streak mosaic virus, and brief comparisons with the viruses of Brome Grass mosaic and Barley stripe mosaic.**—*Plant Dis. Reptr*, 40, 12, pp. 1102–1105, 1 fig., 1956.

In greenhouse inoculation experiments at Beltsville, Maryland, Atsel barley showed variability and some resistance to 13 isolates of wheat streak mosaic virus [36, p. 237]. Local lesions were large, yellow, and frequently fusiform. The systemic symptoms, appearing seven to 30 days after inoculation and always after the local lesions, consisted of streak mosaic markings, fusiform lesions, or a combination of the two. As in wheat, there was no acute or shock phase.

With the viruses of brome mosaic [36, p. 314] and barley stripe mosaic [loc. cit. and next abstract], to both of which Atsel was highly susceptible, systemic symptoms developed usually three or sometimes four days after inoculation, but always before the appearance of the small, local lesions, a shock phase being followed by a chronic phase as in other susceptible varieties of barley and wheat.

Sisler (W. W.) & Timian (R. G.). **Inheritance of the Barley stripe mosaic resistance of Modjo (C.I. 3212) and C.I. 3212–1.**—*Plant Dis. Reptr*, 40, 12, pp. 1106–1108, 1956.

In studies carried out by the United States Department of Agriculture and the North Dakota Agricultural Experiment Station, Fargo, the reaction to inoculation with the California 'E' strain of barley stripe mosaic virus [35, p. 442 and preceding abstract] in the F_2 of crosses between resistant and susceptible barley varieties indicated that resistance in Modjo and C.I. 3212–1 is controlled by at least two genes.

Shaw (Dorothy E.). **Studies on Leptosphaeria avenaria f.sp. avenaria.**—*Canad. J. Bot.*, 35, 1, pp. 97–112, 2 pl., 1957.

Studies were carried out at the Science Service Laboratory, Winnipeg, Canada, during 1953 and 1954 on *Leptosphaeria avenaria* on oats [35, p. 876]. In September, 1953, pycnidia with microspores, in addition to those with macrospores, were found for the first time in nature in Canada [cf. 34, p. 715]. Microspores were subsequently found on stubble throughout the winter, a few being observed in May or June. They appear to predominate at lower temperatures, as opposed to macrospores, the formation of which is favoured by higher temperatures; the latter are found on oats during summer, on stubble in early autumn, and rarely on old stubble in spring. The microspores are uninucleate, and the macrospores and ascospores have only one nucleus per cell at the outset.

No perithecia were obtained in culture, but they were found in early stages on stubble in April, and discharged ascospores in early June. These ascospores germinate in about one hour (in contrast to several hours for the macrospores and some 40 hours for microspores) and are presumably the chief spring inoculum.

The organism pathogenic to oats was obtained only from this host and would not infect other cereals or grasses; its correct name is considered to be *L. avenaria* f.sp. *avenaria*, in view of the erection of f.sp. *triticea* [see next abstract].

Shaw (Dorothy E.). **Studies on Leptosphaeria avenaria f.sp. triticea on cereals and grasses.**—*Canad. J. Bot.*, 35, 1, pp. 113–118, 1957.

In further studies on *Leptosphaeria avenaria* from cereals and grasses [see preceding abstract] isolates non-pathogenic to oats, rye, and certain grasses were assigned to *L.a.* f.sp. *triticea* [27, p. 230]. They are considered to belong to a plurivorous group slightly pathogenic to wheat and occurring on the senescent tissues of other cereals. No microspores were found in culture but perithecia were readily formed in single-spore culture; macrospores were slightly smaller than those of the oat form.

Bruizgalova (Mme V. A.). К биологии **Puccinia graminis Pers. f. secalis.** [On the biology of *Puccinia graminis* Pers. f. *secalis*.]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 201–204, 1951. [Received 1956.]

Studies in the U.S.S.R. indicated that the rust known as *Puccinia graminis* f. *secalis* on rye in Eastern Siberia [cf. 36, p. 91] can develop without an intermediate host and has practically lost the teleutospore stage. As it can overwinter in the uredospore stage on the root system of *Agropyron repens* it is suggested that this form is not *P.g.* f. *secalis* but *P.g.* f. *agropyri*, which readily spreads to cultivated rye.

Taber (W. A.) & Vining (L. C.). **A nutritional study of three strains of Claviceps purpurea (Fr.) Tul. In vitro production of ergot alkaloids by cultures of Claviceps purpurea (Fr.) Tul.**—*Canad. J. Microbiol.*, 3, 1, pp. 1–12, 1 graph, pp. 55–60, 1957.

The growth in a liquid medium of three strains of *Claviceps purpurea* [cf. 35, pp. 157, 719; 36, p. 315] of different geographical origin was measured at the Prairie Regional Laboratory, Saskatoon, Saskatchewan, by dry weight increase. Organic nitrogen proved to be more readily utilized than inorganic; there was no growth in the absence of carbon dioxide. An exogenous supply of biotin was needed for growth in a medium containing glucose, ammonium succinate, and minerals, and this could be almost entirely replaced by biotin L-sulphoxide and biocytin, but only partially by desthiobiotin. Of the carbohydrates tried, glucose, fructose, mannose, sucrose, and cellobiose were utilized readily. Oleate and aspartate stimulated early growth.

Stationary liquid cultures of *C. purpurea*, using a medium containing mannitol, ammonium succinate, and salts, produced a number of ergot alkaloids in small quantity; they were identified chromatographically. Production varied with the strain of the fungus used and the composition of the medium; an incubation period of at least 35 days was necessary. Abe's medium, 50 gm. mannitol, 8 gm. ammonium succinate, 1 gm. potassium dihydrogen phosphate, and 0·3 gm. magnesium sulphate per l. of tap water, adjusted to pH 5·2 to 5·4 with succinic acid, gave the best results.

Kornhauser (A.) & Perpar (M.). **Über den Mangangehalt im Mutterkorn. I & II.** [On the manganese content of ergot. I & II.]—*Naturwissenschaften*, 43, 17, p. 400, 1956; 44, 3, p. 64, 1957.

At the Institute for Organic Chemistry, University of Ljubljana, Yugoslavia, Hranicka's method (*Pharmazie*, 10, p. 331, 1955) was used for the examination of the ash constituents of rye ergot [*Claviceps purpurea*]. Manganese was approximately inversely proportional to alkaloid content [cf. 36, p. 97] in samples from various parts of the country.

Békésy (M). [? N.]. **Progress in the cultivation of ergot of Rye in Hungary.**—Reprinted from *Chem. & Drugg.*, *1955*, 28th May, 2 pp., 3 figs., 1 diag., 1955. [Received March, 1957.]

Much of the information in this interesting survey of recent advances in the cultivation of rye ergot [*Claviceps purpurea*] in Hungary has already been noticed from other sources [36, p. 20]. The selection of sclerotia with a high alkaloid content for the production of 50 to 100 'base cultures' involves the annual analysis of 5,000 to 10,000 individuals. In 1952 the production of ergot with hand implements amounted to 10 tons, while in 1953 the crop was increased to 100 tons by the use of machinery.

Lockwood (J. L.) & Williams (L. E.). **Inoculation and rating methods for bacterial wilt of Sweet Corn.**—*Phytopathology*, 47, 2, pp. 83–87, 1957.

Methods used at the Ohio Agricultural Experiment Station, Wooster, for the

improvement and standardization of inoculation and disease rating methods for assessing the value of chemicals for controlling bacterial wilt (*Bacterium* [*Xanthomonas*] *stewarti*) of maize [36, p. 398] are described. The three youngest fully expanded leaves on a susceptible sweet corn plant were assigned disease ratings from 0 (healthy) to 5 (dead). Six replications of pots containing six plants each were found to be sufficient.

Using a hypodermic syringe method of inoculation [13, p. 390] and plants at the three- to four-leaf stage, the volume of bacterial suspension injected was not important and no significant difference in the disease index was found between those of 1×10^7 and 5×10^7 cells per ml., though the higher inoculum levels gave the lowest coefficients of variance. A new and very effective method of inoculation was by clipping the seedlings at the level of the coleoptile tip and swabbing or spraying the cut ends with a bacterial suspension. Increase of the period between clipping and inoculation decreases disease severity (even after 4 min.); maximum severity was obtained with seedlings at the two-leaf stage and by clipping shoots below the level of the coleoptile tip. Moisture was an insignificant factor.

Le Roux (P. M.) & Dickson (J. G.). **Physiology, specialization, and genetics of Puccinia sorghi on Corn and of Puccinia purpurea on Sorghum.**—*Phytopathology*, 47, 2, pp. 101–107, 2 pl., 3 graphs, 1957.

This paper, the first of a series reporting a project by the University of Wisconsin, Madison, and the United States Department of Agriculture, begun in 1951, gives a preliminary survey of races and biotypes of *Puccinia sorghi* and an account of *P. purpurea*. During the past five years *P. sorghi* has become increasingly prevalent on maize in the central United States [cf. 31, pp. 13, 61], both dent and sweet corn hybrids being generally susceptible.

A self inhibitor of germination [cf. 34, p. 711; 36, p. 159] present in both uredospores and aecidiospores of the fungus serves to prevent spore germination within the uredosorus or aecidium. Both pH and temperature have more influence on aecidiospores than on uredospores; pH 4·6 and 6·4 are the limits for good germination of the former, extending to 8·3 for the latter; the corresponding optimum temperature ranges are 12° to 16° C. and 8° to 28°.

Eight maize lines with genes conditioning resistance and one susceptible inbred were selected to differentiate 14 races of *P. sorghi* and one of *P. purpurea*. One variety, Cuzco, proved resistant to all these races. Race 13, not found in nature but isolated from an aecidium and from a teleutospore of *P. purpurea* on Sudan grass, was pathogenic to four of the maize lines; other clonal lines from the same aecidiospore population as this were pathogenic only on sorghum, Sudan grass, or hybrids of these. Races 1, 7, and 10 of *P. sorghi* from Mexico appear to be generally present from south central Mexico to the north central area of the United States. Aecidial development on *Oxalis corniculata* and *O. europea* differentiated at least two biotypes of *P. sorghi*. *O. corniculata* was the only species susceptible to *P. purpurea*.

Rao (P. N.), Salam (M. A.), & Thirumalachar (M. J.). **A new genus of downy mildew on Sorghum.**—*Mycologia*, 48, 6, pp. 860–864, 4 figs., 1956.

A fungus causing spotting of sorghum leaves and grains at the Agricultural Farm, Oosmania University, Hyderabad, India, in September, 1954, was ascertained to be an undescribed member of the Peronosporales and named *Dicksonomyces sorghi* n.gen., n.sp. The intercellular, hyaline, coenocytic mycelium develops knob-like haustorial processes within the host cells. The distinct conidiophores, emerging through the stomata, are monopodially branched and septate, with four to six cells in the main axis. Each cell except, usually, the bottom one, is elongated and broader at the apex than the base; on the apical half numerous aculeate sterigmata bear ovate to ellipsoid, hyaline conidia, 10 to 22 by 7 to 15 μ, which

germinate by formation of a germ-tube. The oospores measure 20 to 44 μ in diameter, and the wall is 2·5 to 3·5 μ thick, confluent with the wall of the oogonium.

Romano (Antonella). **Osservazioni intorno a 'Gibberella baccata' (Wallr.) Sacc. sugli Agrumi in Sicilia.** [Observations on *Gibberella baccata* (Wallr.) Sacc. on Citrus in Sicily.]—*Agric. ital.*, 56 (N.S. 11), pp. 325–341, 6 figs., 1956. [English summary.]

In November, 1953, mandarin orange trees growing in three localities in Sicily and weakened by various factors were observed to bear on the twigs and leaves abundant fructifications of *Gibberella baccata* [cf. 6, p. 101], both perithecial and conidial [cf. 34, p. 377]. Inoculations of young, healthy mandarin orange trees, others growing in unfavourable conditions, and of limbs artificially weakened all gave negative results, and it is concluded that the fungus is a weak parasite [cf. 19, p. 700]. The morphological and cultural characters of the organism are described.

Romano (Antonella). **Danni da freddo e fusariosi (da Gibberella baccata (Wallr.) Sacc.) fra gli agrumeti della Sicilia.** [Injury due to cold and fusariosis (caused by *Gibberella baccata* (Wallr.) Sacc.) in Citrus orchards in Sicily.]—*Riv. Agrumic.*, 1, 11–12, pp. 463–470, 5 figs., 1 graph, 1956.

In April, 1956, young orange trees growing in several localities in Sicily and damaged by a sudden cold spell in February and a sharp drop in the temperature on 9th March, showed the presence of *Gibberella baccata* on the trunk near soil level. This is considered to confirm the view previously expressed by the author that *G. baccata* is a weak pathogen [see preceding abstract].

Fedorinchik (N. S.). Инфекционное усыхание ('мальсекко') Лимонов и обоснование мероприятий по борьбе с этим заболеванием. [Infectious desiccation ('mal secco') of Citrus and a basis for control measures against this disease.]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 125–142, 5 diags., 1951. [Received 1956.]

The author discusses in detail the peculiarities of and factors responsible for the spread of citrus mal secco (*Deuterophoma tracheiphila*) in the Adzharian A.S.S.R. [see following abstracts] and describes the biology of the fungus, methods of diagnosing infection, and the most important preventive measures, all of which has already been noticed from other sources [loc. cit.; 36, p. 242].

Stepanov (K. M.). О типах поражения Лимонов инфекционным усыханием ('мальсекко'). [Types of infection of Lemon trees with infectious desiccation ('mal secco').]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 143–152, 1951. [Received 1956.]

The author distinguishes three types of infection of lemon by *Deuterophoma tracheiphila* [see preceding and following abstracts], namely, apical, which is predominant and can be controlled by timely and careful pruning [cf. 33, p. 150]; basal, not controlled by pruning; and intermediate, when the fungus penetrates the main branches. The last type may be controlled if detected in time but the nearer infection is to the base of the branch the sooner does it penetrate the trunk, and pruning may then prove ineffective.

Shaluishkina (Mme V. I.). О жизнестойкости гриба **Deuterophoma tracheiphila Petri,** вызывающего инфекционное усыхание Лимонов ('мальсекко'). [Viability of the fungus *Deuterophoma tracheiphila* Petri, causing infectious desiccation of Lemon trees ('mal secco').]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 153–164, 1951. [Received 1956.]

Studies carried out in 1948 and 1949 in the Adzharian A.S.S.R. and under

laboratory conditions at Leningrad, U.S.S.R. showed that the causal agent of citrus mal secco, *Deuterophoma tracheiphila* [see preceding and following abstracts], remained viable as mycelium at −30° [C.]. Pycnidiospores were able to germinate at −13·7°. In dry, infected shoot cuttings the mycelium remained viable at 40°. However, spores in the air-dry pycnidia gradually lost their viability at 30° and if kept for a prolonged period in a dry state died even at room temperature. It appears that the fungus is less resistant to the combined influence of high temperatures and ample moisture, conditions under which the spores rapidly lose their viability.

Polyakov (I. M.) & Shumakova (Mme A. A.). Испытание токсических свойств гриба **Deuterophoma tracheiphila Petri.** [An investigation of the toxic properties of the fungus *Deuterophoma tracheiphila* Petri.]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 165–175, 1 diag., 1951. [Received 1956.]

In studies at Adzharia and Leningrad, U.S.S.R., it was found that as well as producing toxins causing mal secco of lemon trees *Deuterophoma tracheiphila* [36, p. 243 and preceding and next abstracts] possesses certain antibiotic properties inhibiting the growth of *Helminthosporium sativum* [*Cochliobolus sativus*], *Puccinia triticina, Tilletia tritici* [*T. caries*], and *Fusarium graminearum.*

Kiyashko (P. I.). О токсическом действии гриба **Deuterophoma tracheiphila Petri,** возбудителя инфекционного усыхания Лимонов ('мальсекко'). [On the toxic action of the fungus *Deuterophoma tracheiphila* Petri, the causal agent of infectious desiccation of Lemon trees (mal secco).]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 176–177, 1 fig., 1951. [Received 1956.]

In experiments in the U.S.S.R. in 1948 with extracts from lemon plants infected by *Deuterophoma tracheiphila* [see preceding abstracts] the parts of the plant the most susceptible to toxicity appeared to be the nodes. Meyer and Kabo lemons and a mandarin (all resistant), similarly treated, showed no signs of toxicity.

Fourth Annual Report of the West African Institute for Oil Palm Research, 1955–1956.—120 pp., 2 col. maps, 1956.

In the Plant Pathology section (pp. 87–95) of this report [cf. 35, p. 448] it is recorded that losses due to blast disease in the Main Station nurseries during 1955 averaged 20 per cent. Sixty per cent. of the isolations from above the transition zone in newly infected primary roots yielded *Rhizoctonia lamellifera* [18, p. 249] and 30 per cent. a *Pythium*, probably *P. splendens*. *R. lamellifera* was identified on the older decayed roots of all infected seedlings examined; in advanced stages of the disease minute black sclerotia were found on the stele, the cortex being entirely destroyed. The incidence of blast in seedlings inoculated with *R. lamellifera* by dipping the roots in a macerated agar culture and planted in a nursery was no different from that in uninoculated seedlings, but when healthy, five-month-old nursery seedlings were transferred to a nutrient solution inoculated with *R. lamellifera* a typical rot of the young primary roots was observed in five days.

The fungi causing the three types of anthracnose have been identified as (A) *Botryodiplodia palmarum*, (B) *Melanconium elaeidis*, and (C) *Glomerella cingulata*. In trials with a number of fungicides applied fortnightly to seedlings in raised trays and after planting out in the nursery the best control of anthracnose was achieved with sprays prepared from thiram and ziram creams (5 and 2 per cent. of the leaf area being affected, respectively, compared with 21·5 in the untreated), and there were no phytotoxic effects, as with copper or mercury-copper compounds. Even without fungicidal treatment incidence in the nursery was considerably reduced by planting the seedlings at a lower-than-normal density in the trays; at 500 plants per 8 sq. ft. tray 23·25 plants per plot were infected and at 200 only 17,

the percentage leaf area infected being 21·5 and 11, respectively. With wider spacing, damp conditions encouraging fungal growth are obviated, and transplanting shock is reduced. *In vitro* tests with *Glomerella cingulata* spores showed that the degrees of inhibition of germination by ziram and perenox is very similar. The increased effectiveness of the dithiocarbamate creams in the field is attributed to the incorporation of wetting and sticking agents. Investigation of the adhesive properties of Bordeaux mixture and perenox by the plaster of Paris impression method [cf. 32, p. 635] showed the need for incorporating spreaders and stickers in copper fungicides when they are used in areas of high rainfall. Fungi associated with anthracnose as secondary invaders included species of *Glomerella*, *Anthostomella*, *Leptosphaeria*, and *Pestalotiopsis*, and *Oxydotheris* [*Oxydothis*] *elaeicola*, *Corynespora cassiicola*, and *Myrothecium jollymanii*.

In spraying experiments for the control of freckle (*Cercospora* [*elaeidis*: 36, p. 100]) on nursery seedlings the most effective fungicides were parzate, ziram cream and powder, cuprokylt, phygon, and mercurized copper; the copper preparations produced rather severe burning. In another experiment better control was given by griseofulvin than by dithane or karathane.

The fungus associated with the leaf disease known as crusty spot has been identified as *Parodiella circumdata*.

Kalyanasundaram (R.) & Subba-Rao (N. S.). **Temperature effect on the in vivo production of fusaric acid.**—*Curr. Sci.*, 26, 2, pp. 56–57, 1 graph, 1957.

At the University Botany Laboratory, Madras, India, further experiments were made on the production of fusaric acid [36, p. 50] in Karunganni 2 cotton plants infected by wilt (*Fusarium vasinfectum*). With increasing temperatures from 32·5° to 37·5° C. there was a progressive decrease in wilt and a gradual accumulation of detectable fusaric acid in the plants. Cystine was consistently present at 37·5° but not at 32·5° or 35°. The decreased toxicity of fusaric acid at 37·5° was presumably due to the preferential chelation of cystine with free iron or any other metallic ions in the host, rendering them unavailable to the acid.

From the above results it is concluded that higher temperatures may possibly inhibit the formation of certain enzyme systems of the host responsible for the decarboxylation and N-methylation of fusaric acid.

Ranney (C. D.) & Bird (L. S.). **Greenhouse evaluation of in-the-furrow fungicides at two temperatures as a control measure for Cotton seedling necrosis.**—*Plant Dis. Reptr*, 40, 12, pp. 1032–1040, 2 figs., 1956.

In experiments carried out jointly by the United States Department of Agriculture and the Department of Plant Physiology and Pathology, Texas Agricultural Experiment Station, College Station, most of the soil treatments tested in constant temperature tanks [36, p. 243] for the control of seedling necrosis of cotton acted differently at soil temperatures of 70° and 80° F. The captan-PCNB-zineb treatment (1½–1½–2 lb. per acre) was the most consistent, vancide 51 (4 qts. per acre) was excellent at 70°, but at 80° ranked almost as high (determined by damping-off, emergence, final stand, disease grades, and seedling vigour) as the untreated, while captan (5 lb.) was the best treatment at 80° but significantly less effective than the best at 70°. Pre-emergence damping-off was much more severe at 70° than at 80°, the reverse being true of the post-emergence phase. At 80° *Fusarium* spp. were predominant on seedlings in the untreated pans, whereas at 70° *Fusarium* spp., *Rhizoctonia* [*Corticium*] *solani*, and *Pythium* spp. were all active. Fungicides effective against *C. solani* and *Pythium* spp. did not always control *Fusarium* spp., which are regarded as the most important fungi in the damping-off complex in Texas. The importance of applying a fungicide or mixture of fungicides active against all the pathogens is emphasized [cf. 36, p. 245].

Hall (I. M.) & Dunn (P. H.). **Fungi on Spotted Alfalfa Aphid.**—*Calif. Agric.* 11, 2, pp. 5, 14, 1 fig., 1957.

The spotted alfalfa aphid [*Therioaphis maculata*] is reported to be parasitized in California by five as yet unidentified species of entomophthorous fungi [cf. 27, p. 321]. Two of these possess marked pathogenicity and with even distribution and suitable humidity cause considerable reduction of the aphid population. Rapid spread of one of these was augmented in Southern California in 1956 by placing 1800 cultures in infested fields in twelve counties. Modified irrigation to increase humidity has permitted the aphid to be controlled by the fungus in spite of spring winds.

Nelson (P. E.), Williamson (C. E.), & McClellan (W. D.). **Ovulinia flower spot of Azalea found on Long Island.**—*Plant Dis. Reptr*, 40, 12, p. 1115, 1956.

In 1956 *Ovulinia azaleae* [35, pp. 284, 383] was found in the Washington area on potted azalea [*Rhododendron*] plants received from Long Island, New York. The disease has not previously been reported north of Maryland.

McDonough (E. S.) & McGray (R. J.). **Botrytis on Saintpaulia and its relation to mite control.**—*Phytopathology*, 47, 2, pp. 109–110, 1 fig., 1957.

Spraying greenhouse plants of *Saintpaulia ionantha* at Marquette University, Milwaukee, Wisconsin, with 1 ml. dimite in 1 gal. lukewarm water (stronger solutions tended to be phytotoxic) gave good control of mites (? *Tarsonemus pallidus*) and largely eliminated infection by *Botrytis cinerea* [29, p. 308].

Terashita (T.) & Itô (K.). **Some notes on Cylindrocladium scoparium in Japan.**—*Bull. For. Exp. Sta., Tokyo*, 87, pp. 33–47, 2 pl., 4 figs., 1956. [Japanese, with English summary.]

A serious nursery disease of yellow lupins observed at Meguro, Tokyo, in 1948 was caused by *Cylindrocladium scoparium*, which was also responsible for considerable damping-off of broom (*Cytisus scoparius*) in 1952 and of *Eucalyptus globulus* in 1954 [cf. 31, p. 524; 34, p. 168]. The whole of the plant above ground is affected, attacks being worst between June and October; the fungus sporulates plentifully on the lesions. In tests of the host range 28 species in five families (which are listed) proved susceptible to inoculation, the strains from the three original hosts being equally pathogenic. The physiology and cultural characters of the fungus are described. Bordeaux mixture from 1–1–10 to 1–1–50 and uspulun from 1 in 500 to 1 in 4,000 completely inhibited mycelial growth on agar.

Pape (H.) & Domsch (K.). **Zur Beizung von Maiblumenkeimen.** [Steeping of Lily-of-the-Valley shoots.]—*Gartenwelt*, 56, 8, p. 121, 1 fig. 1 graph, 1956.

After noting that mercurial dipping of sprouting lily-of-the-valley rhizomes against *Sclerotium denigrans* and other pathogens may lead to serious damage if the appropriate concentration is exceeded, whilst at the same time repeated use of a dip rapidly exhausts it, the authors recommended treatment at 15° to 18° C. in 0·25 per cent. methoxyethyl mercury chloride for 30 mins. or 0·5 per cent. for ten mins. The dip should be renewed or brought up to strength after being used twice.

Durbin (R. D.). **Hot-water seed treatment for control of a root rot complex of Strelitzia reginae.**—*Plant Dis. Reptr*, 40, 12, p. 1116, 1 fig., 1956.

In trials at the Department of Plant Pathology, University of California, Los Angeles, for the control of a seedling root rot complex of *Strelitzia reginae*, involving a species of *Fusarium*, pre-soaking the seed for a day at room temperature, then immersing in water at 135° F. for 30 mins. resulted in 78 per cent.

germination compared with 12 per cent. for the untreated and 56, 71, and 27 per cent., respectively, for seed immersed at 125°, 130°, and 140°.

HATTINGEN (RUTH). **Schäden durch Fusarium an Gladiolen.** [Damage by *Fusarium* to Gladioli.]—Reprinted from *Gartenwelt*, 1, 2 pp., 1956.

The author briefly outlines the symptoms of infection of gladiolus by *Fusarium oxysporum* var. [f.] *gladioli* [cf. 35, p. 297]. Of several treatments tried against soil infection corm treatment with tritisan was the best, resulting in 88 per cent. sound plants in soil that produced 100 per cent. infection in the controls. The varieties J. S. Bach, Willy Wigmann, Eisenhower, and Marshall Montgomery were very susceptible to artificial infection; Picardy was resistant.

WINSTEAD (N. N.), JENKINS (J. M.), & HAASIS (F. A.). **Reaction of Dutch Iris varieties to Puccinia iridis in North Carolina.**—*Plant Dis. Reptr*, 40, 12, pp. 1112–1114, 1 fig., 1956.

Of the 46 iris varieties inoculated in North Carolina with uredospores of *Puccinia iridis*, Early Blue, Gold and Silver, Golden West, Imperator, Lemon Queen, and Texas Gold were highly resistant and Golden Show and Goudstuk were immune. Since the reactions of four of the varieties were different from those described by Mains in California [17, p. 396] it is possible that a new race of *P. iridis* was present in North Carolina in 1954.

YAMADA (S.). **Experiments on the epidemiology and control of Chrysanthemum white rust, caused by Puccinia horiana P. Henn.**—*Ann. phytopath. Soc. Japan*, 20, 4, pp. 148–154, 2 figs., 1 graph, 1956. [Japanese, with English summary.]

Investigation of the epidemiology of chrysanthemum white rust in Japan, caused by *Puccinia horiana*, showed that the teleutospores germinate between 6° and 36° C. (optimum 18° to 28°) and that sporidial formation, observed on affected leaves six hours after incubation at 24° in the dark, but inhibited by light, occurs between 6° and 24° (optimum 13° to 22°). The sporidia germinate from 6° to 36° (optimum 13° to 18°), uninfluenced by light. The incubation period of the disease is ten days. Teleutospores in the sori were not viable after 20 days under laboratory conditions in May, but at 32 per cent. relative humidity survived for 30 days. Control is best effected by dusting with wettable sulphur.

MARAMOROSCH (K.). **Vinca yellows in Mexico.**—*Plant Dis. Reptr*, 40, 12, pp. 1109–1111, 3 figs., 1956.

A virus disease of *Vinca rosea* observed at Cuernavaca in a subtropical region of Mexico in the summer of 1956 caused colour breaking and virescence of the flowers and the growth of secondary shoots. Under greenhouse conditions in a temperate climate the severity of the disease increased, healthy *V. rosea* plants grafted with infected scions developing extremely short internodes, numerous chlorotic, secondary branches, and very small leaves. During the summer there was partial recovery, indicating that high temperature was also responsible for the milder symptoms first observed in nature. The virus was transmitted by dodder (*Cuscuta subinclusa*) to carrot plants but not by the aster leafhopper (*Macrosteles fascifrons*) from *Vinca* or carrot to carrot or China aster; it is, therefore, distinct from aster yellows [21, p. 340]. *Vinca* yellows appears to be the first typical yellows disease reported from Mexico.

BUDDENHAGEN (I. W.) & YOUNG (R. A.). **A leaf and twig disease of English Holly caused by Phytophthora ilicis n.sp.**—*Phytopathology*, 47, 2, pp. 95–101, 3 figs., 1957.

This is an expanded account from Oregon State College, Corvallis, of a disease of

holly caused by *Phytophthora* sp. [34, p. 328], for which the name *P. ilicis* n.sp. is proposed. It was shown that the defoliation which accompanies the disease is due to the production of ethylene by infected leaf tissue. The disease develops from October to May, and is inactive in the summer.

The pathogen is distinguishable from *P. porri* by its smaller oogonia, and from *P. hibernalis* and *P. syringae* by the consistent presence of amphigynous antheridia. On diseased holly tissues the sporangia have a shallow apical thickening and no papilla, and measure 18 to 30 by 30 to 50 (average 24 by 39) μ, with persistent pedicels, 5 to 15 μ long. Oogonia average 21 μ and oospores 18 μ, with a slightly yellow wall; antheridia average 13 by 11 μ.

HASHIOKA (Y.) & IKEGAMI (H.). **Further experiments on the seed dressing of Chinese Milk Vetch against the sclerotia of Sclerotinia trifoliorum.**—*Res. Bull. Fac. Agric. Gifu Univ.* 6, pp. 50–57, 1 pl., 1956. [Japanese summary.]

In further studies on the protection of *Astragalus sinicus* from *Sclerotinia trifoliorum* in Japan [34, p. 458] it was found that heavy seed dressings containing 50 per cent. thiram and applied at 1·5 per cent. of the weight of the seed-sclerotia mixture, or 80 per cent. thiram at 1 per cent., suppressed sclerotial germination for 40 days; to kill the sclerotia completely 80 per cent. thiram would have to be applied at more than 1·5 per cent. Seed germination was increased by the treatments. Uspulun at over 1 per cent. proved equally effective as a fungicide, but ceresan was of no use.

JOHANSEN (GUDRUN T.) & MYGIND (H.). **Forsøg med frøudsæd af Humle-Snegle-bælg inficeret med stængelsvamp (Ascochyta imperfecta).** [Experiments in sowing seed of Black Medick infected by the stem fungus (*Ascochyta imperfecta*).]—*Tidsskr. Planteavl*, 60, 1, pp. 20–42, 3 figs., 1956. [English summary.]

Seed-dressing experiments for the control of black stem (*Ascochyta imperfecta*) on *Medicago lupulina* have been carried out at intervals since 1940 in Denmark, where the disease was first observed on seed of that host in 1936 and on lucerne in 1939. Primary infection can be reduced to a trace by appropriate treatment, e.g., half-an-hour's immersion in 3 per cent. sanagran V, 0·5 per cent. certosan, or 1 per cent. germisan, or dusting with nomersan at 25 or phygon at 4 gm. per kg., but widespread outbreaks may develop under favourable conditions from secondary infection if only a few diseased seeds per thousand occur among the batches for sowing. Heavy reductions in yield are liable to ensue, since the formation of seed pods at the base of the plants is prevented by severe infection and those in the middle are attacked.

KRISTENSEN (H. R.). **Virussygdomme hos stenfrugttræer.** [Virus diseases of stone fruit trees.]—*Tidsskr. Planteavl*, 60, 1, pp. 69–166, 12 figs., 1956. [English summary.]

Information concerning the viroses of stone fruit trees occurring in Denmark has already been presented from another source [34, p. 527]. This valuable compilation comprises descriptions, based on 154 contributions to the relevant literature, of 66 virus diseases, of which 47 have been reported from the United States, 20 from Canada, two from New Zealand, and 24 from Europe. Among the last-named, nine are considered to be certainly, and another four probably identical with or closely related to North American viroses.

BROOKS (R. M.) & OLMO (H. P.). **Register of new fruit and nut varieties. List 11.**—*Proc. Amer. Soc. hort. Sci.*, 68, pp. 611–631, 1956.

This further list of new varieties developed in the United States and Canada [cf. 35, p. 683] includes the Fenton (Early Delicious) apple, of unknown parentage,

resistant to fireblight [*Erwinia amylovora*: cf. 34, p. 602] and scab [*Venturia inaequalis*: cf. 34, p. 599]; the Renton peach, of unknown parentage, more resistant to leaf curl [*Taphrina deformans*: cf. 32, p. 134] than other varieties; the Harbin pear, from North China seed, used in South Dakota as a rootstock, some seedlings of which are resistant to fireblight; the Antietam raspberry, from Marcy × Sunrise, resistant to leaf spot [*Elsinoe veneta*]; the strawberry varieties Maine 55 and Monmouth, both from Howard 17 × Aberdeen or reciprocal, and highly resistant to the Aberdeen type of red stele [red core: *Phytophthora fragariae*: cf. 23, p. 136]; Orland, from the same cross, also carrying similar red core resistance; Puget Beauty, from U.S.–Oregon 1765 × Sparkle, resistant to red core and mildew [*Sphaerotheca humuli*]; and Siletz (U.S.–Oregon 2172), from U.S.–Oregon 2012 × U.S.–Oregon 1816, apparently tolerant of [unspecified] virus diseases, resistant to red core in Oregon, resistant also to mildew and leaf spot, and expected to outyield Marshall in irrigated areas where red core is a problem.

Baxter (P.). **Trace element deficiencies in fruit trees on Mallee and Wimmera soils.** —*J. Dep. Agric. Vict.*, 55, 1, pp. 11–20, 26, 6 figs., 1957.

This article deals with the effect on all kinds of fruit trees in Victoria of deficiencies of zinc [29, p. 569], manganese (*Aust. J. agric. Res.*, 5, pp. 31–38, 1954), copper, and iron, with recommended control measures. Lime-induced iron deficiency is an important obstacle to fruit growing in calcareous soils of the Wimmera and Mallee irrigation areas [35, p. 365]. The results are given of departmental trials over a number of years in three peach orchards on different types of soil, the responses being assessed by leaf colour. The trees, whether dormant or in leaf, were not improved by spraying with inorganic iron salts or with the iron chelates of EDTA and HEEDTA, whilst FeDTPA, given as an early spray at 0·5 per cent., produced only slight and temporary improvement. Excessive soil moisture should be avoided; it is recommended that cover crops of lucerne should be grown, or permanent pasture established. Leaf mottling due to zinc deficiency is also common on these soils and may be combined with manganese deficiency; zinc-manganese sprays are effective.

Schmidle (A.). **Über Infektionsversuche an Apfelbäumen mit Phytophthora cactorum (Leb. et Cohn) Schroet., dem Erreger der Kragenfäule.** [On inoculation experiments on Apple trees with *Phytophthora cactorum* (Leb. & Cohn) Schroet., the agent of collar rot.]—*Phytopath. Z.*, 28, 3, pp. 329–342, 7 figs., 5 graphs, 1957.

This is a tabulated report from the Horticultural Institute, Heidelberg, Germany, on the results of inoculation experiments with *Phytophthora cactorum* on apple trees, using four strains from collar rot lesions on the same host [35, p. 103], one from a branch necrosis of apricot, and two from decayed strawberry fruits [35, p. 904]. The pathogenicity of the apricot isolate was fully equal to that of the apple strains, one of those from strawberry was of comparable virulence, while the effects of the other were much milder.

In tests on one-year-old, newly planted specimens of a number of varieties grafted on E[ast] M[alling] stocks, the most resistant were Jonathan, Golden Delicious, and James Grieve, while Croncels Transparent, Berlepsch, and Cox's Orange Pippin were particularly susceptible. Two and three-year-old pyramids of Berlepsch proved highly susceptible to spring inoculations, but the effects wore off in the course of the summer. Golden Delicious sustained little damage, while Cox's Orange occupied an intermediate position. The inoculation of the stem bases and stems of 13-year-old bush trees of Berlepsch, Cox's Orange, and Ontario gave mostly negative results. Limited necroses developed on the branches of the same varieties, Berlepsch again being more susceptible than Cox's Orange and also

than Ontario. EM stocks of types II, IV, IX, and XI and Bittenfelder Sämling reacted only by slight necrosis.

Miller (P. M.). **Aluminium foil as an aid to inoculation with Physalospora obtusa.** —*Plant Dis. Reptr*, 40, 12, p. 1117, 1956.

At the Department of Plant Pathology and Botany, Connecticut Agricultural Experiment Station, New Haven, wrapping squares of aluminium foil round apple leaves inoculated with *Physalospora obtusa* [35, p. 23] was of great value in retaining moisture and obtaining heavy infection late in the season, when natural infection is rare. The foil was removed after four days and twisted round the inoculated shoots to serve as a marker. It is easier to handle than plastic bags and only small amounts of inoculum are needed.

Pestinskaya (Mme T. V.). Биологические особенности вида **Sphaeropsis malorum Berk.** [Biological characteristics of the species *Sphaeropsis malorum* Berk.]—*Trud. vsesoyuz. Inst. Zashch. Rast.* 3, pp. 213–221, 1951. [Received 1956.]

A description based on field observations and cultural studies is given of the biological characteristics of *Sphaeropsis malorum* [*Diplodia mutila*] isolated from apple in 11 localities in the U.S.S.R. [34, p. 158]. Two groups of isolates are recognized, the one being distinguished by a higher rate of growth and increased pigmentation.

Lamey (H. A.), Boone (D. M.), & Keitt (G. W.). **Venturia inaequalis (Cke) Wint. X. Growth responses of biochemical mutants.**—*Amer. J. Bot.*, 43, 10, pp. 828–834, 13 graphs, 1956.

In a further study in this series [35, p. 614 and next abstract] 12 biochemical mutants of *Venturia inaequalis*, obtained from the wild-type line 365–4 by treatment with nitrogen mustard or ultraviolet radiation at the University of Wisconsin, each exhibiting a different deficiency, were compared with the original wild type. The biotin-deficient mutant was able to utilize tween 80 in place of biotin. At the higher concentrations choline chloride, L-histidine hydrochloride, L-arginine hydrochloride, and adenine sulphate increased the growth rate of the wild type as well as that of the mutants, while certain concentrations of DL-methionine inhibited both.

Studies along these lines are important in providing a means to determine whether the host contains a particular substance in a form available to the pathogen: if a strain completely deficient for the substance proves pathogenic to apple then clearly the substance is sufficiently available in the host tissues.

Day (P. R.), Boone (D. M.), & Keitt (G. W.). **Venturia inaequalis (Cke) Wint. XI. The chromosome number.**—*Amer. J. Bot.*, 43, 10, pp. 835–838, 9 figs., 1956.

The haploid chromosome number of *Venturia inaequalis* was determined at the University of Wisconsin as seven. A preliminary count revealed the number to be seven in *V. pirina* also.

Miller (P. M.). **Performance of Apple scab fungicides under severe infection conditions.**—*Plant Dis. Reptr*, 40, 12, pp. 1118–1119, 1956.

At the Connecticut Agricultural Experiment Station, New Haven, excellent control of apple scab (*Venturia inaequalis*) [36, p. 192] under conditions conducive to severe infection was obtained with mesulphan, norsulphan, thioneb, and captan, all at 2 lb. per 100 gals., and thiram paste (3 lb.), the ratings ranging from 1·4 to 1·6 as against 9·2 for the untreated in the scale 1 (no infection) to 10 (all leaves

severely infected). Thiram powder gave poorer control than the paste; dichlone at ¼ lb. was very effective (rating 2·1), higher concentrations apparently being unnecessary. Each treatment was applied eight times to McIntosh dwarf trees throughout May and June. Twice during the period the trees were sprayed with an ascospore suspension, each time receiving ten inches of water immediately afterwards by irrigation and as rainfall.

STAEHELIN (M.). **La défense de nos Pommiers et Poiriers contre la tavelure (expériences 1955 et 1956).** [The protection of our Apple and Pear trees against scab (trials 1955 and 1956).]—*Rev. rom. Agric.*, 13, 3, pp. 19–22, 2 figs., 1957.

In 1955 and 1956 the number of showers recorded at the Federal Station for Agricultural Research, Lausanne (730 and 836 respectively), was above the average (680) for the period April to October. In 1956, however, there were more rainy days (101) than in 1955 (82), and this made for difficulties in spraying, reflected in much heavier losses from apple scab [*Venturia inaequalis*] and pear scab [*V. pirina*] [cf. 35, p. 108]. In 1955, when 93·4 per cent. of the apples in untreated control orchards of Boskoop Beauty were scabbed, the scab percentages for sprayed orchards were: wettable sulphur 6·6 per cent.; captan 1·4; zineb 0·7; glyodin 14·1; and mesulphan 1·8. The figures for 1956 for the controls and the same fungicides were: 100 per cent.; 65·5; 64; 72; 55·3; and 70.

HIGDON (R. J.). **Graft-union disorders in certain blight-resistant Pear root and trunk stocks.**—*Proc. Amer. Soc. hort. Sci.*, 68, pp. 44–47, 3 figs., 1956.

In work in southern Oregon F. C. Reimer (*Bull. Ore. agric. Exp. Sta.* 485, pp. 1–24, 1950) [and 5, p. 106] found a few French pear seedlings that were very resistant to fireblight (*Erwinia amylovora*). The most promising were P-18 (introduced as Oregon 18) and P-87. Later, Oregon 18 and the resistant variety Farmingdale were selected as parents for the production of seed from which resistant root-stocks might be grown, and scions of both Oregon 18 and P-87 were used for the trunks and framework.

The first sign of any difficulty appeared in 1954 in several graft unions between Oregon 18 trunk stocks and Oregon 18×Farmingdale seedling roots in some 15-year-old Comice pear trees that had grown vigorously for ten years and then declined. Longitudinal sections showed that after ten years the cambiums ceased to be united and the stems were girdled at the unions. Bark inclusions were present in all declining trees. Some 25 to 30 per cent. of these trees are declining and it is evident that this combination should not be used in the production of pear trees for commercial plantings. Many younger plantings of the same combination also failed to grow satisfactorily. The pear varieties Bosc, Bartlett, and Anjou all make excellent unions with Oregon 18 on Oregon 18×Farmingdale seedling roots. In 1955 it was found that when the Forelle pear was top-worked on P-87 trunk stocks, the unions were abnormal.

MULDER (D.). **Outbreaks and new records. Syria.**—*F.A.O. Pl. Prot. Bull.*, 5, 4, p. 64, 1957.

In September and October, 1956, symptoms resembling those of peach yellows virus [cf. 33, p. 95; map 60] were noted in four peach orchards in Syria, one at the Agricultural School, Kharabo, near Damascus, another near by, and two near Zebedani. The disease was also reported to be present in the Lebanon.

ANGELL (H. R.). **Brown rot of stone fruits. IV. On the Peach in wet and dry weather at harvest-time in 1956.**—*J. Aust. Inst. agric. Sci.*, 22, 4, pp. 293–296, 1956.

In continuation of observations on the effect of soil type on the development of

brown rot of peach (*Sclerotinia fructicola*) at harvest in relation to prevailing weather [35, p. 687] a survey was made of six orchards in the Shepparton district of Victoria. Percentages of diseased Levis Cling were high (22·9 to 75·8, mean 58·4) on light sandy loams, compared with 3·1 to 16·4 (mean 9·6) on heavier soils. For the later varieties Phillip's Cling and Golden Queen the corresponding figures were 26·7 to 72 (mean 43·1) for the lighter soil and 7 to 42 (19·4) for the heavier. Rainfall a week before the harvest of Levis Cling was 3 in. but only 0·4 at the later harvest. In these orchards the usual spraying and pruning operations for the control of brown rot were carried out, but with widely different results on the two soil types. It appears that the differences in destructiveness of the disease could have been due to one variable only, viz., soil type. Stage of maturity, previously suggested as the main determining factor, was widely variable throughout. Control efforts must be directed to the prevention or minimization of the adverse effects of unsuitable soil conditions on the physiology of the tree, especially on fruit ripening.

Wensley (R. N.). **The Peach replant problem in Ontario. IV. Fungi associated with replant failure and their importance in fumigated and nonfumigated soils.**—*Canad. J. Bot.*, 34, 6, pp. 967–981, 1 pl., 7 graphs, 1956.

This further contribution to an investigation at the Harrow Science Service Laboratory, Ontario [cf. 35, p. 199], deals with the fungi in peach orchard soils and in rhizospheres of replants and with the effects of soil fumigation. Fumigation with MC-2, and to a lesser extent DD, benefited the growth of peach replants in all soils and caused a striking reduction in parasitic fungi within the rhizospheres, though having no effect on the toxins (hydrogen cyanide and benzaldehyde) [loc. cit.]. Of a large number of fungi isolated from the soil (which are listed), 14 proved to be facultative parasites on the roots of peach seedlings and were shown to be damaging to these under conditions of low soil moisture combined with high temperatures. *Fusarium equiseti*, *F. moniliforme* [*Gibberella fujikuroi*], *F. oxysporum*, *F. solani*, *Alternaria tenuis*, *Myrothecium verrucaria*, and mycelia sterilia were the parasitic species isolated most frequently. MC-2 gave the necessary protection of replants over a two-year period to enable the re-establishment of a plantation.

Scaramuzzi (G.). **Polimorfismo sintomatologico del complesso virosico del Mandorlo conosciuto come 'mosaico' in Puglia. Parte II.** [Symptomatological polymorphism of the virus complex of Almond known as 'mosaic' in Apulia. Part II.]—*Ann. Sper. agr.*, N.S., 10, 6, pp. 1789–1808, 3 col. pl., 5 figs., 1956. [English summary.]

In further studies on the mosaic virus disease of young almond trees growing in nurseries in Apulia, Italy [36, p. 409], the condition was transmitted by budding to almond, plum, apricot, and peach, all of which developed the characteristic line patterns originally observed on almond. It is supposed that spread occurs largely through grafting and budding and the insufficiently controlled commerce in nursery plants. The yield of affected trees is definitely reduced, varying with the variety, and resistant varieties offer the most promising method of control.

Taylor (O. C.) & Mitchell (A. E.). **Soluble solids, total solids, sugar content and weight of the fruit of the sour Cherry (Prunus cerasus) as affected by pesticide chemicals and time of harvest.**—*Proc. Amer. Soc. hort. Sci.*, 68, pp. 124–130, 2 graphs, 1956.

An investigation at Michigan State College, East Lansing, of the influence of time of picking and of five applications of ferbam or fixed copper with either lead arsenate or parathion on the weight and composition of sour cherry fruits showed that fruits sprayed with the inorganic compounds contained a higher percentage of soluble

solids than those sprayed with the organic, the effect of the fungicides being apparently greater than that of the insecticides.

A significant increase in fruit weight was observable only between those from the first sampling (7th to 10th July) from plots sprayed with fixed copper plus lead arsenate and hydrated lime and those from the final sampling (21st to 24th July) from plots sprayed with ferbam plus parathion.

Rishbeth (J.). **Fusarium wilt of Bananas in Jamaica II. Some aspects of host-parasite relationships.**—*Ann. Bot., Lond.*, N.S., 21, 82, pp. 215–245, 1 graph, 1957.

Following his earlier paper on Panama disease of banana (*Fusarium oxysporum* f. *cubense*) [34, p. 655] the author here reports a series of studies concerning the factors affecting the incidence of the disease and the resistance of the host. Some of this information has already been noticed from another source [33, p. 213]. Incidence is determined by numerous interacting factors including genetically determined resistance, physical and chemical soil conditions, and the abundance of inoculum. Nitrogen fertilizing increases susceptibility.

The effect of rainfall is often marked, a heavy build-up of infection frequently following heavy precipitation in plantations where previously, in comparatively dry weather, the advance of the disease had been slow and steady. In two such cases the increase was sporadic, and was also observed in plants adjacent to those already diseased: with the latter, especially, symptoms appeared so rapidly that the plants were assumed to have been infected beforehand. Where rain is accompanied by high wind, damage to roots may partly explain a drop in resistance. Also the rapid growth following rain may provide greater opportunity for infection.

The action of rain in washing spores down to the roots was simulated in cylinders and pots of soil, from which samples were removed at various depths after flooding with inoculum. Platings showed that penetration was considerable when saturated soil was flooded, and was greater in loam than in clay.

Widespread neglect of crop rotation encourages the build-up of soil infection; the practice of 'clean weeding', carried out with a view to removing vegetation which might compete with the bananas for water, results in leaching and decline of fertility, and in severe cases erosion, which increases the susceptibility of Gros Michel both to wilt and to leaf spot [*Mycosphaerella musicola*; 26, p. 251]. Other practices such as mechanical cultivation have probably increased the local distribution of the pathogen.

In the early stages of rootlet infection the pathogen grows more slowly in the resistant variety Cavendish than in the susceptible Gros Michel, probably because protective tissue reactions are more effective in the former. Under various field conditions Gros Michel can usually seal off root infections at the root bases, although in about five per cent. the pathogen penetrates to the rhizome. Heavy nitrogen manuring somewhat increases the spread of infection from roots to rhizome. Roots of old plants tend to be more resistant than those of young ones.

Resistant varieties usually recover from wilt rapidly. By contrast Gros Michel seldom recovers except on soils of high nutrient status, where infection often becomes stabilized in the rhizome.

In a glasshouse experiment in which Cavendish plants were subjected to temporary waterlogging the roots died and the resistance of the rhizome decreased. Subsequent recovery of resistance was apparently related to the rapidity of new root growth.

Studies *in vitro* indicated that at certain critical levels relatively small changes in the concentration of carbon and nitrogen markedly affected the growth of the pathogen in very dilute solutions, and it thus seems possible that external factors produce their effects by altering the composition of the tracheal fluid.

Stover (R. H.). **Studies on Fusarium wilt of Bananas. I. The behaviour of F. oxysporum f. cubense in different soils.**—*Canad. J. Bot.*, 34, 6, pp. 927–942, 2 pl., 1 fig., 2 graphs, 1956.

Three methods were used at the Division of Tropical Research, United Fruit Company, La Lima, Honduras, to investigate the influence of soil on *Fusarium oxysporum* f. *cubense* [35, pp. 275, 308], viz., soil dilution plates, slides carrying drops of agar spore suspension buried in soils at 15 to 35 per cent. water saturation in glass tumblers [33, p. 363] for two to four weeks and examined 18 hours after addition of nutrients, and a soil plate method similar to Warcup's [29, p. 530; 36, p. 125], but using a different nutrient, usually glutamic acid with 1 per cent. nitrogen. The pathogenicity of doubtful isolates of *F. oxysporum* was tested on banana plants in pots.

F.o. f. *cubense* spores added to sterile and non-sterile soil at 300,000 per gm. decreased within six to eight months to under 500 per gm., below which accurate records were not possible. Soil dilution plates are inadequate for small populations of less than 100 spores per gm., as occur in nature, and the apparently lower *F.o.* f. *cubense* population in sandy loam than in loam which this method always indicated was seemingly due to faults in the technique.

F.o. f. *cubense* did not germinate or sporulate in soil plates unless the soil was sterile or nutrient was added; then large numbers of spores were formed by relatively few hyphae, but when growth and sporulation ceased some 40 hours later most of these spores proved non-viable. Spore production was stimulated by 1 per cent. solutions of tryptophane and glutamic acid, but not by inorganic nitrogen sources. If soils were dried before plating sporulation was greater than if 15 to 35 per cent. saturation had been maintained [cf. preceding abstract].

Sporulation, abundant in all soils below pH 7, was greater in acid sandy loam than in alkaline loam; in soil plates it almost ceased below pH 3·5 in acidified loam and above pH 8·8 in sandy loam, the optimum pH for the former being 5 and the latter 5 to 7. Rate of disease spread in virgin soils was generally correlated with texture, pH, and with growth and sporulation as shown on soil plates and slides, except when a heavy-textured alkaline soil that had been flood fallowed was used. Banana leaf mould was not a favourable environment for *F.o.* f. *cubense*.

In decomposing diseased banana pseudostems [cf. 34, p. 466] *F.o.* f. *cubense* is initially confined to the vascular strands, from which when tissue breakdown begins it grows out and sporulates freely on the surface and in adhering soil, but does so less in the roots, and not at all in the xylem or sap *in vivo*. In soil plates, however, fresh banana sap stimulates spore production.

The known survival of *F.o.* f. *cubense* for 20 years in soils in the absence of bananas indicates multiplication either on wild hosts or saprophytically in the soil. Disease spread in Central America is not always correlated with soil texture and pH, and factors as yet unknown may be involved. In natural soils the liberation of amino-acids by plant roots into the rhizosphere may cause sporulation, without which, or the adoption of the parasitic habit, the fungus must perish; the soils, and not the host, exert the primary influence on the fungus.

Oxenham (B. L.). **Diseases of the Pineapple.**—*Qd agric. J.*, 83, 1, pp. 13–26, 13 figs., 1957.

In this account of pineapple diseases in Queensland a brief description is given of the symptoms and control of each, much of the information having already been noticed in this *Review* [34, p. 43 *et passim*]. Top or heart rot, caused by *Phytophthora cinnamomi* [36, p. 307] and less commonly by *P. parasitica* [15, p. 378], which attacks the crop in the spring and early summer in South Queensland, particularly in the northern areas, is stated to be serious on flat or poorly drained land. In addition to the control measures already noticed [loc. cit.] avoiding conditions

favourable for the disease, the practice of good cultural methods, replacement of infected plants by the largest plants available, and dipping replants in strong Bordeaux mixture (7:7:20) to prevent subsequent infection are recommended. The cultural measures also apply to the control of root rot wilt which is largely due to *P. cinnamomi* [14, p. 457]. Crop rotation is advisable.

Marbling caused by [unspecified] bacteria [14, p. 216] is most severe on the smooth Cayenne variety. Possible control includes close spacing of plants to reduce fruit size, high potassium fertilizing to increase fruit acidity, and delaying maturity of the summer crop.

Yeasty rot, caused by various yeasts, affects sunburnt or injured fruit and is responsible for wastage on the southern markets. External symptoms are a bubbling exudation of gas and juice and browning of the skin, which becomes leathery, and the whole fruit spongy. The decaying flesh inside is bright yellow, is ruptured by large gas cavities, and eventually becomes a mass of fibrous tissue. The only control in the field is adequate protection of maturing fruit from sunburn. Hygiene in picking and packing is important.

Das-Gupta (S. N.), Iyer (S. N.), & Verma (G. S.). **Studies in the diseases of Mangifera indica Linn. IX. Isolation of a brick-kiln fume constituent causing Mango necrosis.**—*Indian J. agric. Sci.*, 26, 3, pp. 259–266, 1 graph, 1956.

A full description is given of work at Lucknow University previously reported in brief [18, p. 330; 23, p. 69; 30, p. 174]. A single crystalline substance isolated from brick kiln fumes produced typical symptoms of necrosis when a solution was injected into the tip of healthy mango fruits. The slow decline of the disease in orchards following the removal of the source of fumes is attributed to the retention of the active substance in the foliage.

Salerno (M.). **La ticchiolatura del Nespolo del Giappone.** [Scab of Loquat.]—*Tec. agric.* (*1956*), 7–8, pp. 356–359, 2 figs., 1956.

A brief account is given in semi-popular terms of the symptoms, causal organism, and control (by improved orchard hygiene and fungicidal spraying) of loquat scab (*Fusicladium* [*dendriticum* var.] *eriobotryae* [cf. 31, p. 335]); with special reference to the occurrence of the disease in Italy [14, p. 777]. Observations are stated to have shown that there is an inverse correlation between the severity of infection and the precocity of the tree.

Jepson (W. F.). **Methods of plant protection for peasants in the tropics.**—*Outlook on Agric.*, 1, 2, pp. 59–63, 1956.

Though writing mainly from the standpoint of the entomologist, the author discusses the problems involved in introducing to peasant farmers modern methods of crop protection, referring, *inter alia*, to the control of cacao diseases in Ghana.

Gallay (R.). **Vers une orientation nouvelle de la lutte antiparasitaire.** [Towards a new orientation in the control of parasites.]—*Rev. rom. Agric.*, 13, 3, pp. 17–19, 1957.

The author considers that under Swiss conditions plant protective spraying is best entrusted to cooperative enterprises employing skilled personnel, and outlines the prerequisites for success.

Zur Frage der rückentragbaren Sprühgeräte. [On the question of knapsack sprayers.]—*Schweiz. landw. Mh.*, 34, 5, pp. 277–278, 1956.

This is a directive from the plant protection division of Fontan (manufacturers of spraying apparatus) concerning the mode of operation of their knapsack aerosol sprayers, particularly for use in orchards in Switzerland.

Taylor (R. E.). **Control of fungi under glass.**—*J. Sci. Fd Agric.*, 7, suppl. issue, pp. S82–S88, 1956.

In this paper, read at the National Crop Protection Conference, Eastbourne, Sussex, November, 1955, dealing mainly with tomato diseases with special reference to the Evesham area, the author noted the value of cuprous oxide applied as a coarse spray to wet the stem bases and surface soil in the glass house for the control of [unspecified] tomato root rot. The value of soil sterilization with steam or formaldehyde was also stressed. Good control of wire stem [*Rhizoctonia* sp.] of cauliflower seedlings is obtained by the application of 1 oz. mercuric chloride in 12½ gals. water at 1 gal. per sq. yd. of seedbed before sowing, and at 1 oz. in 15 gals. on the seedlings.

The control of *Didymella lycopersici* [36, p. 138] on tomatoes in glasshouses was dealt with in detail. Residual soil infection may be countered by wetting the soil with formaldehyde (1 gal. of 0·8 per cent. per sq. yd.) before removing the roots, and using formaldehyde with soft soap to wash down the house; this treatment also inactivates tomato [tobacco] mosaic virus. Winter preparation should include soil treatment with formaldehyde at 7 to 10 gals. per sq. yd. An application of ethyl mercury phosphate, 1 part in 16,000, at 1 gal. per sq. yd., two to seven days before planting is effective against *D. lycopersici*. Plants with primary infections should be rogued at once.

Botrytis [*cinerea*: cf. 36, p. 139] on stem lesions on tomato can be checked by application of creosote or gas tar. The similarity of the lesions to those of the more serious *D. lycopersici* is often misleading.

Control of tomato leaf mould [*Cladosporium fulvum*: 35, p. 656] requires a fungicide not readily visible on the fruit, such as colloidal copper in white oil emulsion. Promising results have been obtained with salicylanilide used as a low volume spray and with phenyl mercury salicylate as an aerosol.

Capryldinitrophenyl crotonate (6 oz. of 25 per cent. wettable powder to 100 gals. spray) controlled powdery mildew of cucumber [*Erysiphe cichoracearum*: 35, pp. 655, 657] and showed promise against chrysanthemum mildew [*Oidium chrysanthemi*: cf. 35, p. 780].

Samra (A. S.). **Relative value and mode of action of some fungicides used as seed disinfectants and protectants.**—*Meded. LandbHogesch., Wageningen*, 56, 5, pp. 1–55, 2 pl., 13 graphs, 1956. [Dutch summary.]

The first part of this paper deals with investigations at the Phytopathological Laboratory, Wageningen, the Netherlands, into the control of *Alternaria* spp. (mainly *A. raphani*) on radish seed [cf. 30, pp. 140, 208] by chemicals. Organic mercury compounds proved better than thiram products and were more effective wet than as dusts, ceresan and germisan wet treatments being the best (99 per cent. control) and, at 1 per cent. for four to eight mins., non-phytotoxic.

The fungus was shown to be able to penetrate to the interior of the seed, when germination may be prevented. The fungicidal effect of ceresan increased when seed was stored up to 32 days after treatment, but the phytotoxic effects were also greater.

Of the antibiotics tested, some had no effect, and actidione, though giving control, proved too phytotoxic. Rimocidin at 200, 400, or 800 p.p.m., for 16, eight, and four hours, respectively, was more effective; at 400 p.p.m. for 30 hours it eliminated deep-seated infection without injury to the seed and in this was superior to ceresan.

The second part deals with the relative value of thiram and mercurials as seed protectants against [unspecified] soil fungi. In cold tests with maize seed (germination in unsterilized field soil at low temperature) [cf. 36, p. 241] arasan SF-X at 0·2 to 0·3 per cent. was the most effective of the thiram products and was less phytotoxic and more persistent than ceresan-new.

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ERRATA

Vol. XXXVI, page 276, line 16: for '*polysora*' read '*sorghi*'; for '237' read '279'.

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